INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS FOR

V9A SERIES BOILER



AHRI CERTIFIED®
www.ahridirectory.org

ETL LISTED
Intertek
3050579

ASME
H

⚠WARNING This manual must only be used by a qualified heating installer/service technician. BEFORE installing, read all instructions in this manual and all other information shipped with the boiler. Post all instructions and manuals near the boiler for reference by service personnel. Perform steps in the order given. Failure to comply could result in severe personal injury, death or substantial property damage.

BURNHAM®
Commercial Boilers
www.burnhamcommercial.com

8142958R21 - 4/15

Price - $5.00

IMPORTANT INFORMATION -
READ AND SAVE THESE INSTRUCTIONS FOR REFERENCE

All boilers must be installed in accordance with National, State and Local Plumbing, Heating and Electrical Codes and the regulations of the serving utilities. These Codes and Regulations may differ from this instruction manual. Authorities having jurisdiction should be consulted before installations are made.
In all cases, reference should be made to the following Standards:

USA BOILERS

A. Current Edition of American National Standard ANSI/NFPA 31, "Installation of Oil Burning Equipment", for recommended installation practices.
B. Current Edition of National Fuel Gas Code, NFPA 54/ANSI Z223.1.
C. Current Edition of American National Standard ANSI/NFPA 211, "Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances", For Venting requirements.
D. Current Edition of American Society of Mechanical Engineers ASME CSD-1, "Controls and Safety Devices for Automatically Fired Boilers", for assembly and operations of controls and safety devices.
E. All wiring on boilers installed in the USA shall be made in accordance with the National Electrical Code and/or Local Regulations.

CANADIAN BOILERS

A. Current Edition of Canadian Standards Association CSA B139, "Installation Code for Oil Burning Equipment", for recommended Installation Practices.
B. The equipment shall be installed in accordance with the current Installation Code for Gas Burning Appliances and Equipment, CSA B149, and applicable Provincial Regulations for the class; which should be carefully followed in all cases.
Authorities having jurisdiction should be consulted before installations are made.
C. All wiring on boilers installed in Canada shall be made in accordance with the Canadian Electrical Code and/or Local Regulations.

Hazard definitions

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels or to important information concerning the life of the product.

⚠DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury or property damage.

⚠WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.

NOTICE

Indicates special instructions on installation, operation, or maintenance which are important but not related to personal injury hazards.

⚠DANGER

DO NOT store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

If you smell gas or fuel oil vapors, do not try to operate the burner/boiler system. Do not touch any electrical switch or use any phone in the building. Immediately call the gas or oil supplier from a remotely located phone.

Burner/boiler systems produce steam or hot water in a pressurized vessel by mixing extremely flammable gaseous, liquid or solid fuels with air to produce combustion and very hot products of combustion. Explosions, fires severe personal injury, death and/or property damage will result from improper, careless or inadequate installation, operation or maintenance of fuel-burning and boiler equipment.

⚠WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Failure to follow all instructions in the proper order can cause personal injury or death. Read and understand all instructions, including all those contained in component manufacturers manuals which are provided with the appliance before installing, starting-up, operating, maintaining or servicing this appliance. Keep this manual and literature in legible condition and posted near appliance for reference by owner and service technician.

This boiler requires regular maintenance and service to operate safely. Follow the instructions contained in this manual.

Installation, maintenance, and service must be performed only by an experienced, skilled and knowledgeable installer or service agency.

All heating systems should be designed by competent contractors and only persons knowledgeable in the layout and installation of hydronic heating systems should attempt installation of any boiler.

It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when the installation is completed.

Installation is not complete unless a pressure relief valve is installed into the specified tapping on the supply manifold located on top and at rear of appliance - See Section III, Paragraph 33, 'e' of this manual for details.

This boiler is NOT suitable for installation on combustible flooring.

Do not tamper with or alter the boiler or controls. Retain your contractor or a competent serviceman to assure that the unit is properly adjusted and maintained.

Clean boiler at least once a year - preferably at the start of the heating season to remove soot and scale. The inside of the combustion chamber should also be cleaned and inspected at the same time.

Have Burner and Controls checked at least once a year or as may be necessitated. Do not operate unit with jumpered or absent controls or safety devices. Do not operate unit if any control, switch, component, or device has been subject to water.

Return water cannot be lower than 135°F for prolonged periods of time. Operation under these conditions will result in sustained condensing within the combustion chamber and potentially reduce boiler longevity. In addition, the return water cannot be introduced into the boiler if it is more than 40°F less than the idle boiler temperature. Continued operation under these conditions may result in premature boiler failure through thermal shock.
Example: A boiler that has been idle for some time since the last heat demand cycle may have it's boiler water temperature reduced to 150°F. The return temperature from the next zone activation cannot be less than 110°F.
If the above conditions exist, an RTC (or similar type of control system) system must be installed to protect the boiler from sustained condensing operation and thermal shock. See separate RTC Manual, P/N 8146382.

⚠WARNING

Appliance materials of construction, products of combustion and the fuel contain alumina, silica, heavy metals, carbon monoxide, nitrogen oxides, aldehydes and/or other toxic or harmful substances which can cause death or serious injury and which are known to the state of California to cause cancer, birth defects and other reproductive harm. Always use proper safety clothing, respirators and equipment when servicing or working nearby the appliance.

This boiler contains very hot water under high pressure. Do not unscrew any pipe fittings nor attempt to disconnect any components of this boiler without positively assuring the water is cool and has no pressure. Always wear protective clothing and equipment when installing, starting up or servicing this boiler to prevent scald injuries. Do not rely on the pressure and temperature gauges to determine the temperature and pressure of the boiler. This boiler contains components which become very hot when the boiler is operating. Do not touch any components unless they are cool.

This appliance must be properly vented and connected to an approved vent system in good condition. Do not operate boiler with the absence of an approved vent system.

This boiler needs fresh air for safe operation and must be installed so there are provisions for adequate combustion and ventilation air.

The interior of the venting and air intake systems must be inspected and cleaned before the start of the heating season and should be inspected periodically throughout the heating season for any obstructions. Clean and unobstructed venting and air intake systems are necessary to allow noxious fumes that could cause injury or loss of life to vent safely and will contribute toward maintaining the boiler's efficiency.

This boiler is supplied with controls which may cause the boiler to shut down and not re-start without service. If damage due to frozen pipes is a possibility, the heating system should not be left unattended in cold weather; or appropriate safeguards and alarms should be installed on the heating system to prevent damage if the boiler is inoperative.

This boiler is designed to burn No. 2 fuel oil,, natural and/or LP gas only. Do not use gasoline, crankcase drainings, or any oil containing gasoline. Never burn garbage or paper in this boiler. Do not convert to any solid fuel (i.e. wood, coal). All flammable debris, rags, paper, wood scraps, etc., should be kept clear of the boiler at all times. Keep the boiler area clean and free of fire hazards.

Probe and Ffoat type low water cutoff devices require annual inspection and maintenance. Refer to instructions in Section V, Paragraph C for inspection and cleaning instructions.

NOTICE

This boiler has a limited warranty, a copy of which is printed on the back of this manual.

It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when the installation is complete. The warranty for this boiler is valid only if the boiler has been installed, maintained and operated in accordance with these instructions.

NOTICE

All V9A Series cast iron boilers are designed, built, marked and tested in accordance with the ASME Boiler and Pressure Vessel Code, Section IV, Heating Boilers. An ASME Data Label is factory applied to each V9A jacket, which indicates the boiler Maximum Allowable Working Pressure (MAWP). Each cast iron section is permanently marked with the MAWP listed on the boiler's ASME Data Label. Those values for the V9A are as follows:

MAWP, Steam - 15 psi
MAWP, Water (USA) - 80 psi
MAWP, Water (Canada) - 45 psi

It is common and acceptable practice to install these boilers in lower pressure systems, below the boiler MAWP. Therefore, Burnham offers safety relief valves set at or below the MAWP of the boiler. See Table 1 for available safety relief valve set pressures.

Important Product Safety Information
Refractory Ceramic Fiber Product

⚠WARNING

The Repair Parts list designates parts that contain refractory ceramic fibers (RCF). RCF has been classified as a possible human carcinogen. When exposed to temperatures above 1805°F, such as during direct flame contact, RCF changes into crystalline silica, a known carcinogen. When disturbed as a result of servicing or repair, these substances become airborne and, if inhaled, may be hazardous to your health.

AVOID Breathing Fiber Particulates and Dust

Precautionary Measures:

Do not remove or replace RCF parts or attempt any service or repair work involving RCF without wearing the following protective gear:

1. A National Institute for Occupational Safety and Health (NIOSH) approved respirator
2. Long sleeved, loose fitting clothing
3. Gloves
4. Eye Protection

- Take steps to assure adequate ventilation.
- Wash all exposed body areas gently with soap and water after contact.
- Wash work clothes separately from other laundry and rinse washing machine after use to avoid contaminating other clothes.
- Discard used RCF components by sealing in an airtight plastic bag. RCF and crystalline silica are not classified as hazardous wastes in the United States and Canada.

First Aid Procedures:

- If contact with eyes: Flush with water for at least 15 minutes. Seek immediate medical attention if irritation persists.
- If contact with skin: Wash affected area gently with soap and water. Seek immediate medical attention if irritation persists.
- If breathing difficulty develops: Leave the area and move to a location with clean fresh air. Seek immediate medical attention if breathing difficulties persist.
- Ingestion: Do not induce vomiting. Drink plenty of water. Seek immediate medical attention.

SORT OUT ALL CARTONS, BUNDLES, AND SECTIONS AND CHECK AGAINST SHIPPING LIST CHART BELOW TO BE CERTAIN THAT YOU HAVE ALL THE MATERIAL REQUIRED TO ASSEMBLE THE BOILER YOU ORDERED.

		(1)					(2)							(2)		(3)															
V9A BOILER SHIPPING LIST (KNOCKDOWN ONLY)		FRONT SECTION	"C" CENTER SECTION	"CT" CENTER SECTION	"CX" CENTER SECTION	BACK SECTION	BOILER ASSEMBLY CARTON							TARGET WALL CTN.	CANOPY CARTON	FLUE OUTLET CARTON				JACKET CARTON	STEAM TRIM CARTON				WATER TRIM CARTON			BNR. MTG. PLATE CTN.	BNR. ADP. PLATE CTN.	REAR OBSERVATION PORT COVER CTN.	BURNER CARTON	RTC CARTON (OPTIONAL)
							CARTON NO.									COLLAR DIA. (inches)					903/904A	905/908A	909/911A	912A	903/905A	906/909A	910/912A					
BOILER MODEL							3	4	5	6	7	M				7	8	10	12													
V903A	STEAM L/HTR	1	1			1	1							1	1	1				1	1				1			1	1	1	1	1
	STEAM W/HTR	1		1		1																										
	WATER L/HTR	1	1			1	1							1	1	1				1	1				1			1	1	1	1	1
	WATER W/HTR	1		1		1																										
V904A	STEAM L/HTR	1	2			1		1							1	1				1	1				1			1	1	1	1	1
	STEAM W/HTR	1	1	1		1																										
	WATER L/HTR	1	2			1		1							1	1				1	1				1			1	1	1	1	1
	WATER W/HTR	1	1	1		1																										
V905A	STEAM L/HTR	1	3			1			1						1		1			1		1			1			1	1	1	1	1
	STEAM W/HTR	1	2	1		1																										
	WATER L/HTR	1	3			1			1						1		1			1		1			1			1	1	1	1	1
	WATER W/HTR	1	2	1		1																										
V906A	STEAM L/HTR	1	4			1				1					1		1			1		1				1		1	1	1	1	1
	STEAM W/HTR	1	2	2		1																										
	WATER L/HTR	1	4			1				1					1		1			1		1				1		1	1	1	1	1
	WATER W/HTR	1	2	2		1																										
V907A	STEAM L/HTR	1	5			1					1				1		1			1		1				1		1	1	1	1	1
	STEAM W/HTR	1	3	2		1																										
	WATER L/HTR	1	5			1					1				1		1			1		1				1		1	1	1	1	1
	WATER W/HTR	1	3	2		1																										
V908A	STEAM L/HTR	1	6			1		1				1			1			1		1		1				1		1	1	1	1	1
	STEAM W/HTR	1	4	2		1																										
	WATER L/HTR	1	6			1		1				1			1			1		1		1				1		1	1	1	1	1
	WATER W/HTR	1	4	2		1																										
V909A	STEAM L/HTR	1	7			1			1			1			1			1		1			1			1		1	1	1	1	1
	STEAM W/HTR	1	4	3		1																										
	WATER L/HTR	1	7			1			1			1			1			1		1			1			1		1	1	1	1	1
	WATER W/HTR	1	4	3		1																										
V910A	STEAM L/HTR	1	8			1				1		1			1			1		1			1				1	1	1	1	1	1
	STEAM W/HTR	1	5	3		1																										
	WATER L/HTR	1	8			1				1		1			1			1		1			1				1	1	1	1	1	1
	WATER W/HTR	1	5	3		1																										
V911A	STEAM L/HTR	1	9			1					1	1			1				1	1			1				1	1	1	1	1	1
	STEAM W/HTR	1	6	3		1																										
	WATER L/HTR	1	9			1					1	1			1				1	1			1				1	1	1	1	1	1
	WATER W/HTR	1	6	3		1																										
V912A	STEAM L/HTR	1	9		1	1		1				2			1				1	1				1			1	1	1	1	1	1
	STEAM W/HTR	1	5	4	1	1																										
	WATER L/HTR	1	10			1		1				2			1				1	1				1			1	1	1	1	1	1
	WATER W/HTR	1	6	4		1																										

(1) INDICATES MAXIMUM POSSIBLE USAGE OF "CT" SECTIONS PER BOILER SIZE.

(2) BOILER ASSEMBLY CARTON AND TARGET WALL CARTON NOT REQUIRED WHEN SECTIONS ARE FACTORY ASSEMBLED.

(3) REAR FLUE OUTLET IS STANDARD. TOP OUTLET AS SPECIFIED ON ORDER.

OPTIONAL EQUIPMENT:

- V9-2 TANKLESS HEATER (QUANTITIES AS ORDERED)
- HEATER OPENING COVER PLATE
- ADDITIONAL CONTROLS (TYPE AND QUANTITY AS SPECIFIED ON ORDER)

TABLE OF CONTENTS

SECTION I - GENERAL INFORMATION

Dimensional Information 9
Ratings/Data 10
Locating the Unit 11
Air Supply/Venting 12

SECTION II - CAST IRON BLOCK ASSEMBLY (Knockdown Only)

Assembly of Sections, Manual Draw-up 15
Assembly of Sections, Hydraulic Draw-up 18
Hydrostatic Test 19

SECTION III - INSTALLATION INSTRUCTIONS

Knockdown

Canopy 21
Flue Cover Plates 23
Rear Observation Port Cover 24
Inspect All Boiler Seals 24
Jacket Assembly 24
Burner Mounting Plate / Burner Adapter Plate 26
Steam Trim 27
Water Trim 27
Burner Installation 28

Package Boilers

Preparation for Installation 28

Common Installation Requirements

Boiler Piping - Water Heating Applications 29
Boiler Piping - Steam Heating Applications 30
Boiler Piping - Domestic Hot Water (DHW) Applications 39
Tankless Heater Piping 40
Electric Wiring 44

SECTION IV - OPERATING INSTRUCTIONS

Filling System 45
Adjusting Controls 45
Adjusting Burner 46
Test Controls 46
Initial Cleaning, Steam Boilers 46
Initial Cleaning, Water Boilers 47
Frequent Water Addition 48
Oxygen Corrosion 48

SECTION V - SERVICE INSTRUCTIONS

Cleaning Boiler Heating Surfaces 49
Maintenance of Low Water Cutoff Devices 50
Checking Burner & Controls 51
Lubrication 51
General Maintenance Considerations 51
Attention to Boiler While Not in Operation 51

TABLE OF CONTENTS - CONTINUED

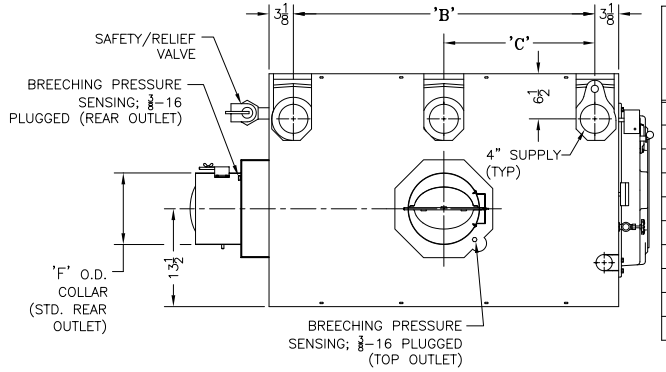
SECTION VI - BURNER SPECIFICATIONS

Beckett Burners (Table V) 52
Power Flame Burners (Table VI) 53
Webster Burners (Table VII) 54
Carlin Burners (Table VIII) 55

SECTION VII - REPAIR PARTS

Customer Service Contact Information 55
Jacket Assembly 56
Bare Boiler Assembly 58
Steam/Water Trim 61

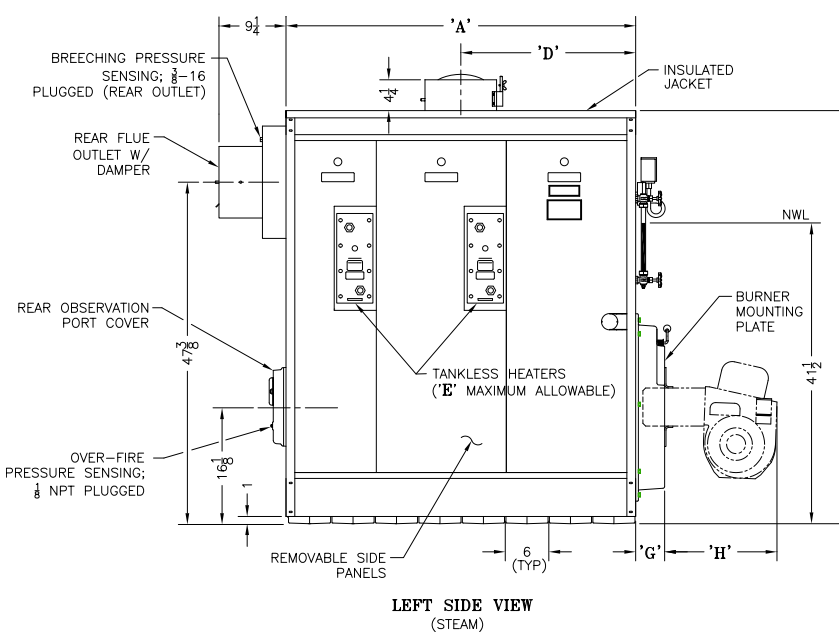
WARRANTY ..... REAR COVER



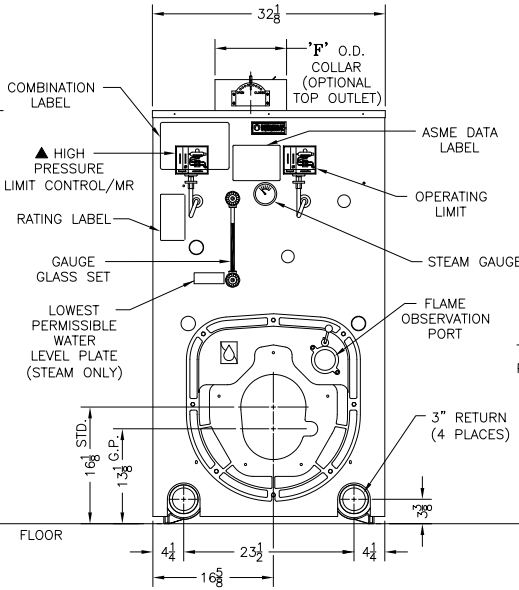
TOP VIEW

BOILER MODEL	NUMBER OF SECTIONS	'A'	'B'	NUMBER OF STEAM RISERS	'C'	'D'	NUMBER OF MAXIMUM HEATERS 'E'	FLUE OUTLET DIAMETER 'F'	BURNER MOUNTING PLATE/BURNER DIMENSION * BECKETT CF 'G'/'H'	BECKETT CG 'G'/'H'	CARLIN 'G'/'H'	POWER FLAME JR 'G'/'H'	POWER FLAME C 'G'/'H'	WEBSTER 'G'/'H'	APPROX. ASSEMBLED SECTION WEIGHT LB.	APPROX. K.D. BLR. SHIPPING WEIGHT LB. **
V903A	3	18 1/4	12	1	—	9 1/8	1	7	8 / 9 3/4	8 / 20 5/8	8 / 23 1/4	8 / 20 1/8	—	—	908	1278
V904A	4	24 1/4	18	1	—	12 3/8	1	7	8 / 11 3/4	8 / 21 5/8	8 / 23 1/4	8 / 20 1/8	8 / 30	—	1194	1590
V905A	5	30 1/4	24	1	—	15 1/8	1	8	8 / 11 3/4	8 / 21 5/8	4 / 27 3/8	8 / 20 1/8	8 / 30	4 / 25	1480	1902
V906A	6	36 1/4	30	1	—	18 1/8	2	8	4 / 20 5/8	4 / 21 5/8	4 / 27 3/8	4 / 20 1/8	4 / 30	4 / 25	1766	2218
V907A	7	42 1/4	36	2	—	21 1/8	2	8	4 / 20 5/8	4 / 28 5/8	4 / 27 3/8	4 / 23 5/8	4 / 30	4 / 25	2052	2534
V908A	8	48 1/4	42	2	—	24 1/8	2	10	4 / 20 5/8	4 / 28 5/8	4 / 27 3/8	4 / 23 5/8	4 / 35	4 / 25	2338	2846
V909A	9	54 1/4	48	2	—	27 1/8	3	10	4 / 21 1/8	4 / 29 1/8	4 / 29 7/8	4 / 23 5/8	4 / 35	4 / 25	2624	3227
V910A	10	60 1/4	54	2	—	30 1/8	3	10	4 / 21 1/8	4 / 29 1/8	4 / 29 7/8	—	4 / 35	4 / 25	2910	3559
V911A	11	66 1/4	60	2	—	33 1/8	3	12	4 / 22 5/8	4 / 29 1/8	4 / 29 7/8	—	4 / 35	4 / 25	3196	3870
V912A	12	72 1/4	66	3	30	36 1/8	4	12	4 / 22 5/8	4 / 29 1/8	4 / 29 7/8	—	4 / 35	4 / 25	3482	4197

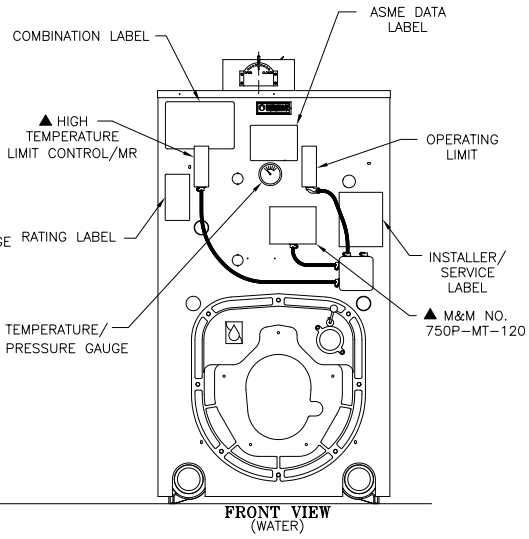
* BURNER CONTROL PANEL CONFIGURATION MAY CHANGE THIS DIMENSION.
** DOES NOT INCLUDE BURNER MOUNTING PLATE (SHIPPED SEPARATELY)
ADD 55 LB. FOR 4" STANDARD BURNER MOUNTING PLATE
ADD 85 LB. FOR 8" EXTENDED BURNER MOUNTING PLATE
▲ NOT FURNISHED AS STANDARD



LEFT SIDE VIEW
(STEAM)



FRONT VIEW
(STEAM)



FRONT VIEW
(WATER)

Figure 1: Dimensional Information

Table I: Boiler Ratings / Data

(1)			(2)							(3)	(4)					
Boiler Model	Horse-Power	Gross Output (MBH)	Net I=B=R Rating			Burner Input		Heating Surface (Sq. Ft.)		New Firebox Volume (Cu. Ft.)	Pressure in Firebox (In. Wtr. Clmn.)	Water Content (Gal.)		Boiler Weight w/Water (Lbs.)		Vent Dia. (In.)
			Sq. Ft. Steam	MBH Steam	MBH Water	Oil (GPH)	Gas (MBH)	Steam	Water			Steam	Water	Steam	Water	
V903A	10.3	347	1083	260	302	---	447	34.2	37.0	3.2	.33	44.5	66.0	1439	1618	7
V904A	14.4	483	1508	362	420	4.2	606	48.6	54.3	4.8	.38	53.0	75.0	1811	1995	7
V905A	19.3	646	2021	485	562	5.6	808	63.0	71.5	6.4	.31	61.5	84.0	2184	2372	8
V906A	24.1	808	2525	606	703	7.0	1010	77.5	88.8	7.9	.38	70.0	93.0	2557	2749	8
V907A	28.6	959	2996	719	834	8.3	1198	91.9	106.0	9.5	.36	78.5	102.0	2930	3126	8
V908A	33.2	1110	3471	833	965	9.6	1386	106.3	123.3	11.0	.35	87.0	111.0	3303	3503	10
V909A	10.1	1342	4225	1014	1167	11.6	1674	120.7	140.5	12.6	.35	95.5	120.0	3676	3880	10
V910A	45.6	1528	4867	1168	1329	13.2	1905	135.1	157.8	14.2	.40	104.0	129.0	4048	4257	10
V911A	51.2	1714	5513	1323	1490	14.8	2136	149.5	175.0	15.7	.45	112.5	138.0	4421	4634	12
V912A	56.8	1900	6142	1474	1652	16.4	2367	164.0	192.3	17.3	.49	121.0	147.0	4794	5011	12

(1) Type of Build Prefix: K = Knockdown, A = Knockdown w/Assembled Sections, P = Packaged, F = Packaged and Firetested

Trim Suffix: S = Steam Boiler, W = Water Boiler

Fuel Suffix: N = Natural Gas, P = LP Gas, O = Oil, C = Natural Gas/Oil, D = LP Gas/Oil, M - Less Burner

Burner Suffix: B = Beckett, C = Carlin, J = Power Flame JR, P = Power Flame C, W = Webster, L = Less Burner

(2) I=B=R net ratings shown are based on piping and pick-up allowances which vary from 1.333 to 1.289 for steam and 1.15 for water. Consult manufacturer for installations having unusual piping and pick-up requirements, such as intermittent system operation, extensive piping systems, etc. The burner capacity in GPH is based on oil having a heat value of 140,000 BTU per gallon.

(3) Firebox volume does not include added volume of 8" extended burner mounting plate (BMP). If 8" BMP is specified (refer to Figure 1), add 0.7 cu. ft. to volume listed above.

(4) Boiler ratings are based on 12.5% CO_2 (oil) and 9.7% CO_2 (natural gas), + .10" (inches) water column pressure at boiler flue outlet. Ratings shown above apply at altitudes up to 1000 feet on oil and 2000 feet on gas.

For altitudes above those indicated, the ratings should be reduced at the rate of 4% for each 1000 feet above sea level.

Safety (Relief) Valve Set Pressure: USA Steam Boiler - 15 PSI, USA Water Boiler - 50 PSI
Optional USA Water Boiler - 30 PSI, 80 PSI (special order)
Canadian Steam Boiler - 15 PSI, Canadian Water Boiler - 45 PSI
Optional Canadian Water Boiler - 30 PSI (special order)

A. INSPECT SHIPMENT carefully for any signs of damage.

1. ALL EQUIPMENT is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of crated boiler to the carrier in good condition.
2. ANY CLAIMS for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances from, or shortage in orders, will be allowed by the manufacturer unless presented within sixty (60) days after the receipt of goods.

B. LOCATE THE UNIT

1. RECOMMENDED SERVICE CLEARANCE - Locate the unit in the boiler room so as to provide ease of venting and adequate clearance for maintenance, serviceability, and installation of piping. Refer to Figure 1 for boiler dimensional data.

   FRONT — Provide 43" service clearance for removal, maintenance, and servicing of burner and controls.

   REAR — Provide a minimum clearance from the boiler jacket for access to flame observation port, rear flue damper and vent piping, relief valve, and boiler return piping. See Table III.

   LEFT SIDE — Provide a minimum clearance from the boiler jacket of 26" for cleaning of flueways and installation and removal of tankless heater(s).

   RIGHT SIDE — Provide a minimum clearance from the boiler jacket of 12".

   TOP — Provide a minimum clearance from the boiler jacket of 24"

NOTICE

Recommended clearance for service may be reduced to minimum clearance to combustible material. However, increased service and maintenance difficulty will result.

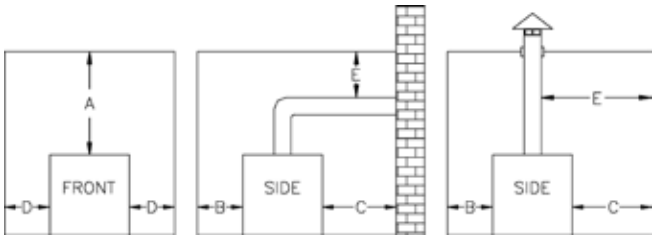
⚠WARNING

This boiler is NOT suitable for installation on combustible floor.

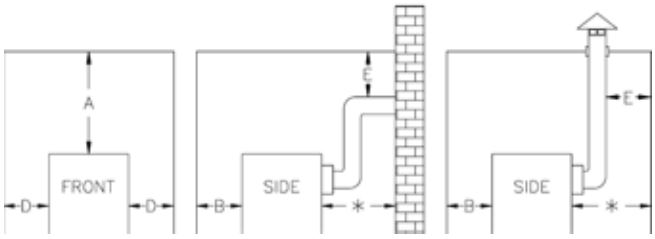
Floor construction should have adequate load bearing characteristics to bear the weight of the boiler filled with water (see Table 1). A boiler foundation similar to the one shown in Figure 2 is recommended if the boiler room floor is weak or uneven or if a water condition exists.

2. FOR MINIMUM CLEARANCES to combustible materials, See Table II.
3. PROVIDE ADEQUATE FOUNDATION for the unit. Refer to Figure 2.

Table II: Minimum Clearances To Combustible Materials (Inches)



Boilers with Top Flue Outlet



Boilers with Rear Flue Outlet

A	B	C	D	E
Above	Front	Rear	Sides	Vent Connector
6	24	6	6	18

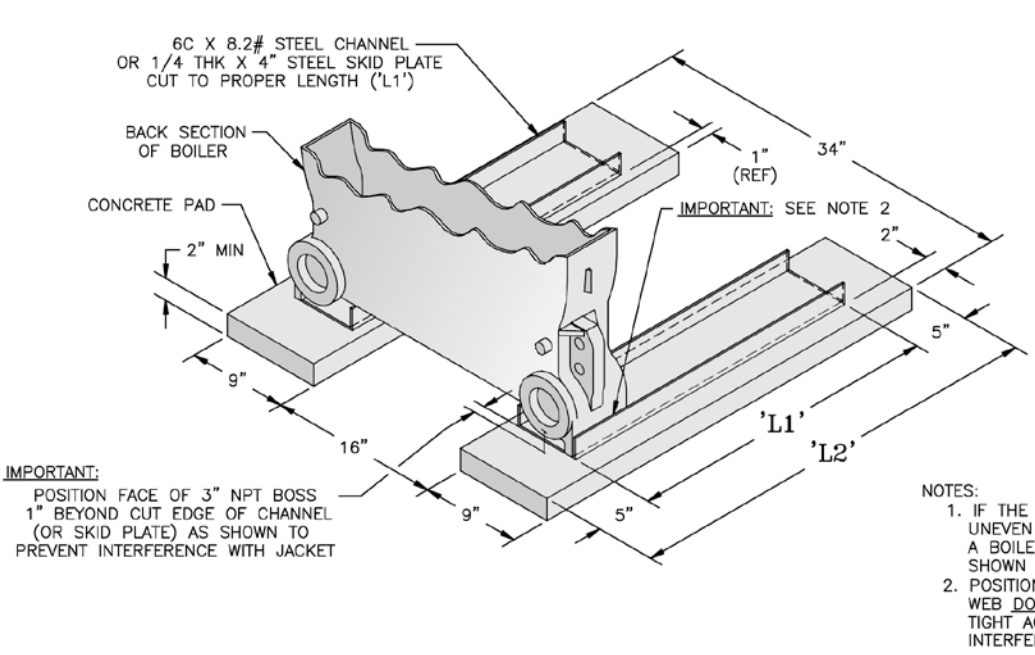
* See Table III for Recommended Service Clearance to access rear of boiler

NOTES:

1. Listed clearances comply with American National Standard ANSI/NFPA 31, Installation of Oil Burning Equipment.
2. V9A Series boilers can be installed in rooms with clearances from combustible material as listed above. Listed clearances cannot be reduced for alcove or closet installations.
3. For reduced clearances to combustible material, protection must be provided as described in the above ANSI/NFPA 31 Standard.

Table III: Recommended Rear Service Clearance

Flue Outlet Size	Top Flue Outlet	Rear Flue Outlet	
		Combustible Surfaces	Non-Combustible Surfaces
7" Dia.	18"	37"	22"
8" Dia.		38"	23"
10" Dia.		40"	25"
12" Dia.		43"	28"



NO. OF SECTIONS	'L1' CHANNEL LENGTH	'L2' CONCRETE LENGTH
3	16"	26"
4	22"	32"
5	28"	38"
6	34"	44"
7	40"	50"
8	46"	56"
9	52"	62"
10	58"	68"
11	64"	74"
12	70"	80"

NOTES:
1. IF THE BOILER ROOM FLOOR IS WEAK OR UNEVEN OR IF A WATER CONDITION EXISTS, A BOILER FOUNDATION SIMILAR TO THE ONE SHOWN IS RECOMMENDED.
2. POSITION CHANNEL LEGS UP AND FLAT WEB DOWN AS SHOWN. CHANNEL MUST BE TIGHT AGAINST CASTING LEGS TO PREVENT INTERFERENCE WITH JACKET.

Figure 2: Boiler Foundation

⚠WARNING

Failure to supply adequate air to the boiler will result in unsafe boiler operation.

C. PROVIDE AIR SUPPLY AND VENTILATION to accommodate proper combustion.

For commercial and industrial equipment, permanent facilities for supplying an ample amount of outside air shall be provided in accordance with the following.

For boiler rooms adjacent to outside walls, and where combustion air is provided by natural ventilation from the outside, there shall be a permanent air supply inlet having a total free area of not less than 1 sq. inch per 4,000 Btu per hr. (35 sq. inch per gallon per hour) (5.5 cm^2 per kw.) of total input rating of the burner or burners and in no case less than 35 sq. inch (0.425m^2).

For boiler rooms not adjacent to outside walls, the combustion air shall be supplied in a manner acceptable to the authority having jurisdiction.

1. In the absence of local requirements, the confined space shall be provided with two permanent openings, one in or near the top of the room and one near the bottom. The openings shall communicate by means of ducts, with the outdoors or to such spaces (crawl or attic) that communicate with the outdoors.
   a. Where communicating by means of vertical ducts, each opening shall have a free area of not less than 1 sq. inch per 4,000 Btuh (35 sq. inch per gph) (5.5 cm^2 per kw) of total input rating of all appliances in the enclosure.
   b. If horizontal ducts are used, each opening shall have a free area of not less than 1 sq. inch per 2,000 Btuh (70 sq. inch per gph.) (11 cm^2 per kw) of total input of all appliances in the enclosure.

D. CHIMNEY OR VENT

⚠WARNING

When a V9A gas fired boiler is connected to a venting system that is designed so that it will operate under a negative pressure, the use of Type C, B, or other manufactured vent systems designed for negative pressure is acceptable.

When a V9A oil fired or combination gas/oil fired boiler is connected to a venting system that is designed so that it will operate under a negative pressure, the use of Type C, L or other manufactured vent systems designed for negative pressure is acceptable.

Unlined masonry chimneys are not acceptable. Lined masonry chimneys are acceptable with the appropriate vent connectors using materials described above.

⚠WARNING

When a V9A gas fired boiler is connected to a venting system that is designed so that it will operate under a positive pressure, manufactured vent systems, designed and approved for positive pressure application per UL1738, must be used (for example, Van-Packer model CS, Protech Model FasNSeal / FasNSeal W2, Heatfab Saf-T-Vent or equivalent).

When a V9A oil fired or combination gas/oil fired boiler is connected to a venting system that is designed so that it will operate under a positive pressure, manufactured vent systems, designed and approved for positive pressure application, must be used (for example, Selkirk Metalbestos Model PS / IPS, Van-Packer Model ES or equivalent).

The V9A Series boiler is designed for forced draft firing and may be used with a conventional natural draft stack (15' minimum height) or a stub vent, sometimes called a diesel stack (see Figure 3a). See Table I for the proper vent outlet size. For low silhouette vent terminations, see Figure 3b. Draft controls are not normally required, although they may be used on installations where a natural draft stack is used or on multiple boiler installations with a common stack. The boiler is provided with a breeching damper, which should be adjusted to maintain a positive pressure of 0.1" W.C. in the vent connector box during burner high fire operation (see breeching pressure sensing port in Figure 1).

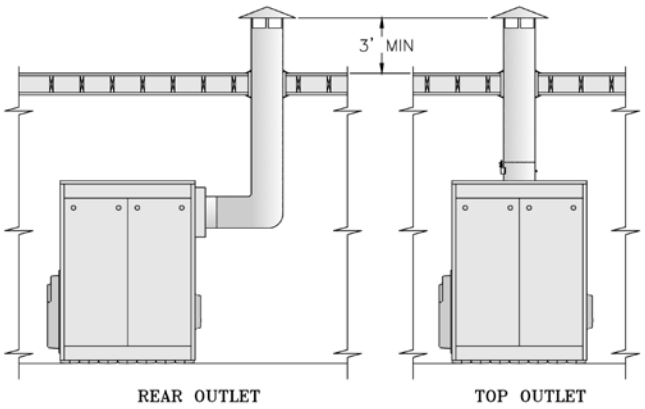


Figure 3a: Typical Arrangement for Stub Vent

If the venting system is designed for positive or forced draft venting, the boiler, vent connector and stack will operate under positive pressure. Gas tight vent systems designed for pressure systems must be used to prevent flue by-product leakage. The vent height is usually limited to prevent negative draft, typically three (3) feet above the roof line (see Figure 3a). The damper shall be adjusted to maintain a positive pressure of 0.1" W.C. in the vent connector box during burner high fire operation (see breeching pressure sensing port in Figure 1).

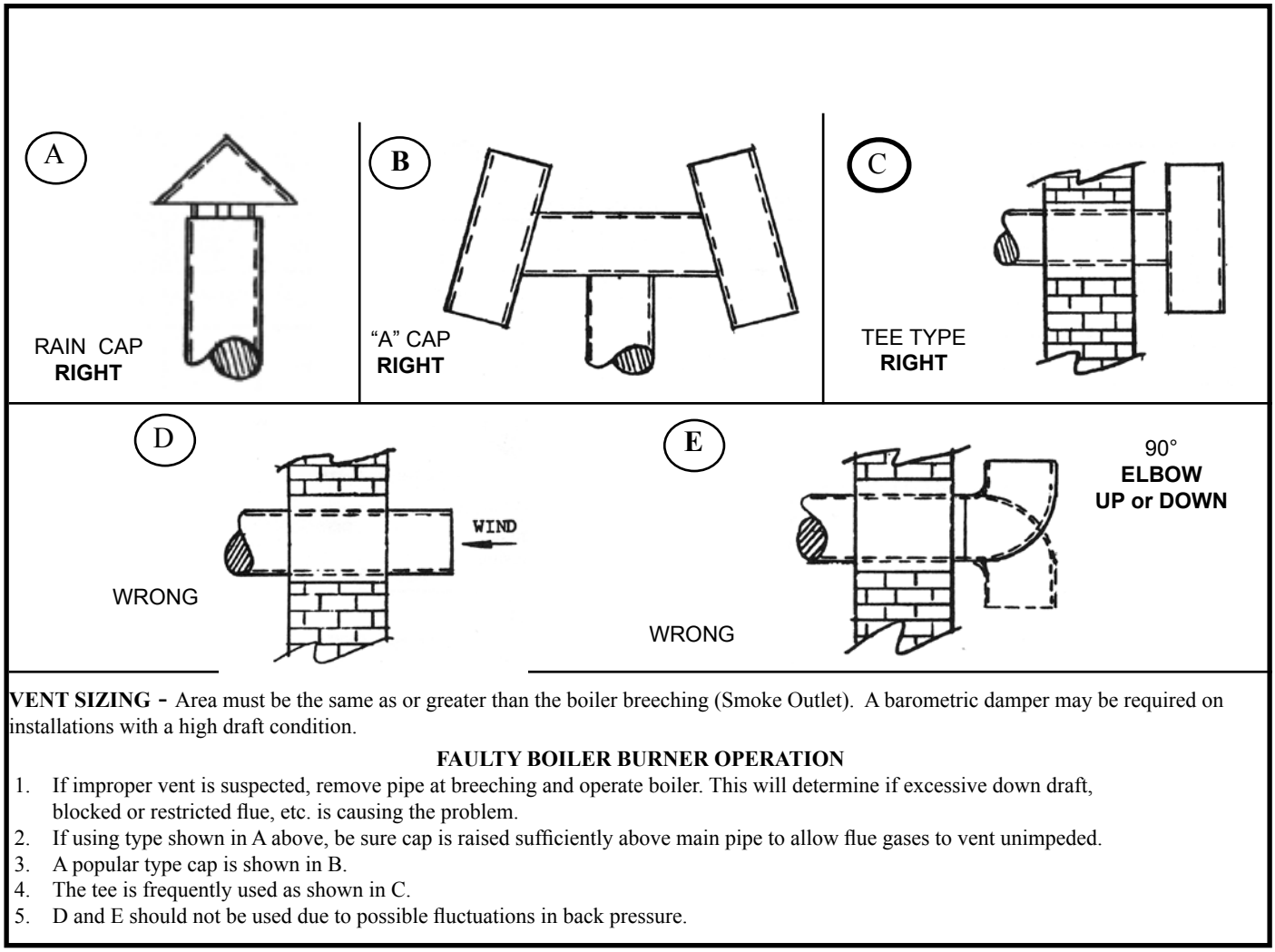
If the venting system is designed for negative pressure (natural draft), the boiler still operates with positive pressure in the chamber and up to the fixed damper on the flue collar. However, if the venting system is larger than what is required, the stack will provide a surplus draft (or negative pressure) that may require the use of a barometric damper to maintain the positive 0.1" W.C. pressure at the flue outlet. Multiple forced draft boiler stacks should always be designed as negative to ensure the products of combustion do not exit a boiler that is not firing.

⚠WARNING

Venting instructions are guidelines only. Consult a venting expert on the design of a specific vent system for your application. The ASHRAE Venting Guide and The National Fuel Gas Code, NFPA 54 should be considered in all venting systems.

Conventional vent material may not be suitable for the application. Flue gases can leak carbon monoxide from the joints on these materials and can result in severe personal injury or death.

Installations having long horizontal runs or an excessive amount of tees or elbows will restrict the flow of combustion gases and can result in condensation, flue gas leakage of carbon monoxide, resulting in severe personal injury or death.



VENT SIZING - Area must be the same as or greater than the boiler breeching (Smoke Outlet). A barometric damper may be required on installations with a high draft condition.

FAULTY BOILER BURNER OPERATION

1. If improper vent is suspected, remove pipe at breeching and operate boiler. This will determine if excessive down draft, blocked or restricted flue, etc. is causing the problem.
2. If using type shown in A above, be sure cap is raised sufficiently above main pipe to allow flue gases to vent unimpeded.
3. A popular type cap is shown in B.
4. The tee is frequently used as shown in C.
5. D and E should not be used due to possible fluctuations in back pressure.

Figure 3b: Vents — Faults & Suggestions
Typical Vents that are used on Forced Draft Boilers, on Low Silhouette Buildings

SECTION II - CAST IRON BLOCK ASSEMBLY

A. FACTORY ASSEMBLED SECTIONS — If the boiler was ordered with factory assembled sections, the assembly should be set in the proper location as outlined in Section I. Lifting arrangement and weights are given in Figure 4.

1. Proceed to Paragraph C of this Section, "HYDROSTATIC TEST".

⚠ CAUTION

Boiler sections must be drawn-up on perfectly level surface or improper assembly may result.

B. FIELD ASSEMBLED SECTIONS — If the boiler was ordered to be field assembled, follow the assembly procedure outlined on the following pages.

1. ASSEMBLY OF SECTIONS (MANUAL DRAW-UP)

   These sections are designed to be drawn together, one section at a time, using the 9¾" long draw-up rods (provided) and ordinary hand tools.

   Tools required:
   (1) ¾" Drive Ratchet
   (1) 1-1/16" Socket
   (1) 1-1/16" Combination or Open End Wrench
   (1) Container of grease, oil or other appropriate lubricant.

NOTICE

When assembling sections without hydraulic draw-up equipment, never assemble more than one section at a time.

   a. Place the rear section in its approximate final position, as outlined in Section I, and support it with a suitable prop and wedges. See Figure 5.

NUMBER OF SECTIONS	LIFTING WEIGHT (LBS)	MIN. SLING LENGTH 'L'
3	908	7'
4	1194	7'
5	1480	7'
6	1766	8'
7	2052	8'
8	2338	8'
9	2624	9'
10	2910	9'
11	3196	9'
12	3482	10'

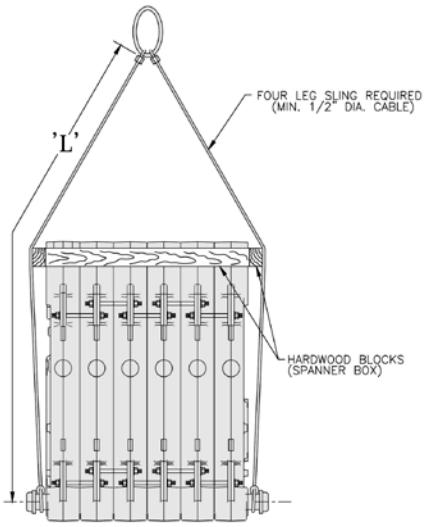


Figure 4: Lifting Instruction

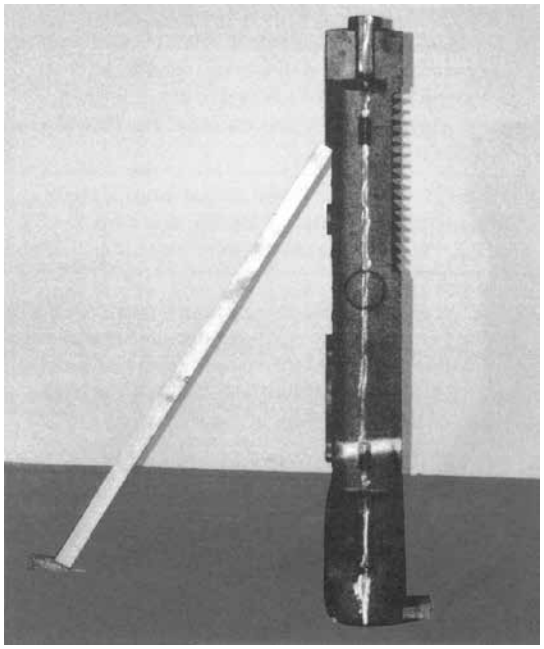


Figure 5: Positioning of Back Section

   b. On size V903A only— Open target wall carton, apply Silastic to back of target wall and secure target wall to rear section.

   c. Clean the groove in the ground joint along the edge of the section with the wire brush.

   d. Open the Boiler Assembly Carton(s) and remove the bottle of adhesive. Using the dauber supplied in the bottle, apply the adhesive to the groove. Be sure to use enough adhesive to sufficiently coat the entire groove surface. If so desired, a multi-purpose spray adhesive (supplied by others) may be used instead. HOWEVER, GREAT CARE MUST BE TAKEN TO ENSURE THAT THE ADHESIVE DOES NOT COME IN CONTACT WITH THE NIPPLES OR NIPPLE PORTS.

   e. While the adhesive is becoming tacky, clean nipples and nipple ports thoroughly with a de-greasing solvent. Use the Loctite #592 provided to lubricate the nipples and nipple ports. Apply the lubricant to the nipples and nipple ports, then use a brush to disperse it evenly around the nipples and the nipple ports. Use approximately 25 ml of Loctite #592 per flueway [(1) 7" and (2) 3" nipples and their (6) corresponding nipple ports].

   f. Drive nipples squarely into section using block of wood and hammer, or preferably, an aluminum head hammer. (Burnham offers a Polyethylene Block for setting the nipples, part number 8052601). Place block over entire nipple edge and hit the wood with the hammer.

NOTICE

Nipples must be driven in evenly and to the proper depth to assure tight joints. Most nipple leaks are caused by tilted or cocked nipples.

DO NOT use steel/iron head hammer to drive nipples without using a wood block. Nipple damage may result.

g. A special nipple setting gauge is provided for the nipples. Gauge nipple at 90° angles to insure that it is driven to the proper depth into the nipple opening (nipple port). Cut-out in gauge must rest on nipple, with legs of gauge touching finished face of section, when nipple is properly driven. See Figure 6.

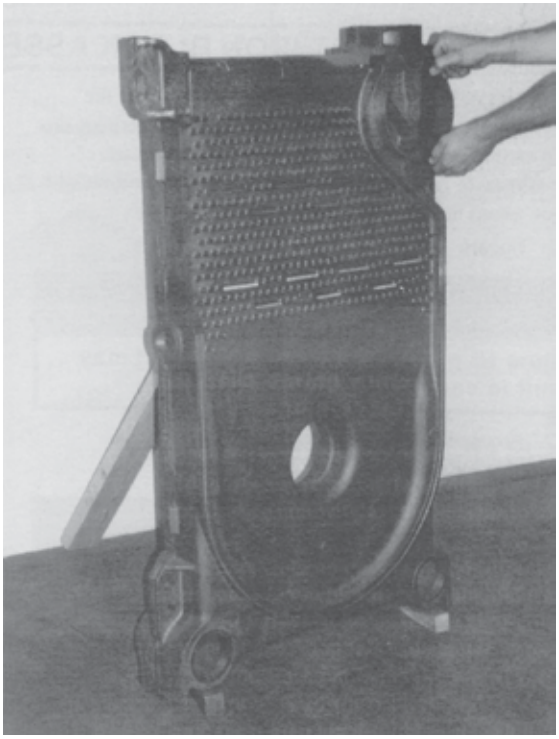


Figure 6: Setting of Nipples

h. Remove a 96" length of fiberglass rope from the assembly carton. Starting with the area around the upper 7" nipple port, firmly press the rope into the groove, so that the adhesive holds it in place. (If more than 25 minutes have passed since the adhesive was applied, it may be necessary to reapply.) Continue to affix the rope to the groove in this fashion around the perimeter of the section. Make sure that the rope does not droop or hang outside of the groove. When the end of the groove is reached, cut off the excess rope. Push the length of excess rope into the groove at the top corner of the section face (opposite of the 7" nipple port.) Cut off and discard any remaining rope after groove is filled. See Figure 7.

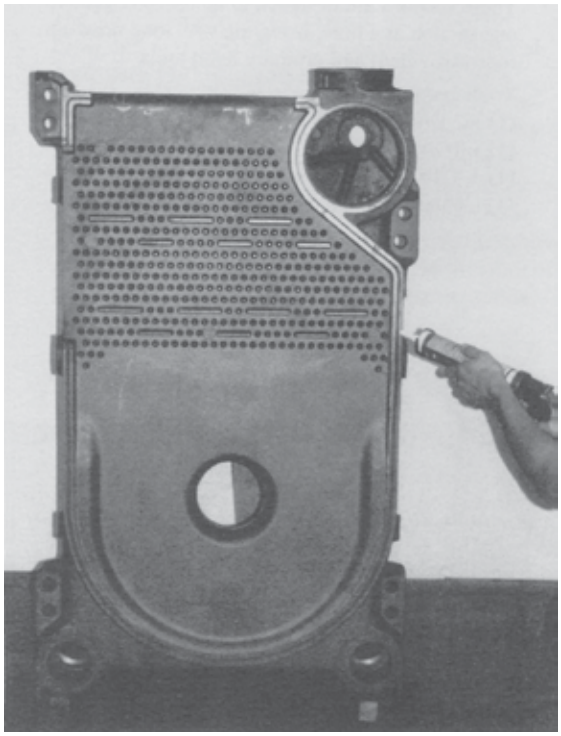


Figure 7: Affixing the Fiberglass Rope

NOTICE

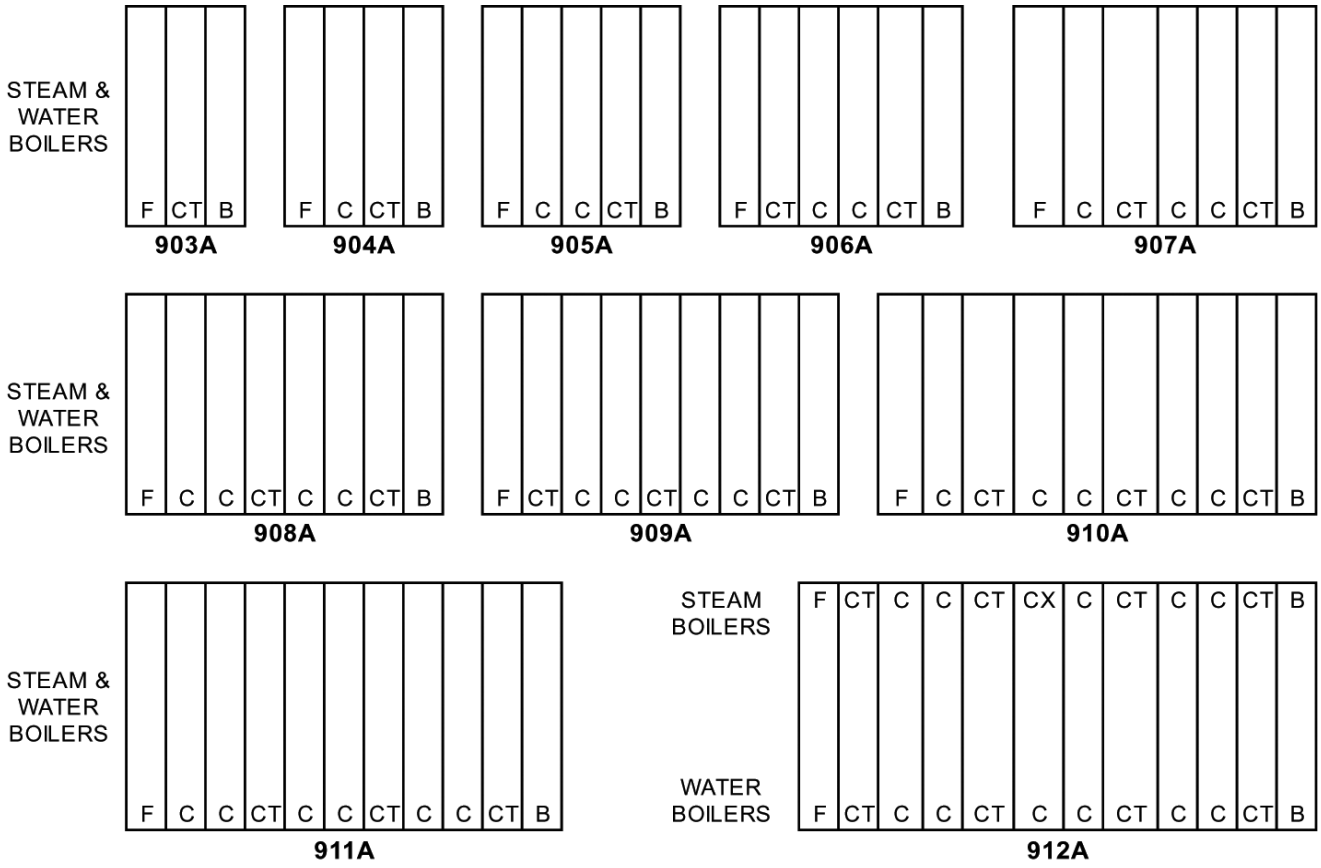
The sections must be assembled according to the arrangement shown to ensure proper operation, proper assembly of canopy, jacket and alignment of piping and tankless heaters with jacket knockouts. Start with the back section and work towards the front.

i. From the "Section Arrangement" chart, select the next section according to the "Identification Code" at the top of the chart. See Figure 8. Use a wire brush to clean the groove in the face of the next section. Then, using a cartridge of RTV 6500 or RTV 736 sealant in a caulking gun, fill the groove in this section with silastic sealant. Touch-up any missed spots before draw-up. Touch-up after draw-up has no value.

⚠WARNING

Sections must be drawn-up tight immediately after properly applying sealant for best results. Although sections may be joined within two (2) hours of applying sealant, humidity and temperature affect cure time. If a "thick skin" has been formed on the sealant bead, remove and re-apply sealant.

Sealant must be properly applied to ALL boiler joints. Failure to properly seal the boiler joints will result in combustion gas leaks through the joint. DO NOT operate boiler with combustion gas leaks.



NOTES: FOR BOILERS LESS TANKLESS HEATER, REPLACE THE "CT" SECTIONS WITH "C" SECTIONS. TANKLESS SECTIONS: IF BOILER CAN TAKE MULTIPLE TANKLESS COILS, BUT NOT ALL TANKLESS COILS WILL BE USED, INSTALL COILS TOWARDS BACK OF BOILER, FOLLOWING SECTION ARRANGEMENT CHART.

Figure 8: V9A Section Arrangement

j. Clean and lubricate nipple ports on next section to be assembled and place on nipples previously installed in rear section. To facilitate assembly, it is advisable to enter the upper nipple first in its port. Then enter the lower nipples in their respective ports. If necessary, place a lifting bar (crowbar) under the center of the section and lift the nipple port onto the upper nipple.

k. Drive sections in place with a heavy block of wood, striking blows as squarely as possible over nipple port.

l. The large draw-up rod lugs with dual holes are cast in the four (4) corners of each casting. STARTING WITH THE UPPER HOLES, install four (4) 5/8" x 9¾" long draw-up rods along with washers and nuts (see Figure 9).

NOTICE

To avoid damage to the draw-up rod threads while drawing up sections, apply oil or other lubricant to tie rod threads while assembling sections to prevent stripping of threads on rod and to make assembling easier.

m. DRAW UP SECTION SLOWLY AND EVENLY using an alternating pattern starting with the upper right lug (closest to the 7" port) and proceeding to the lower left , lower right and finishing with upper left lug. When you start, grind surfaces between adjoining sections should be approximately 3/8" apart. Use three (3) or four (4) passes at tightening the four (4) draw-up rods a little at a time so that sections are pulled up evenly. During the last pass, pay close attention to the silastic sealant as it squeezes when the sections come in close contact. The silastic sealant should continue to squeeze out wafer thin until the sections are connected metal to metal. If the silastic has stopped squeezing out from the connection and the sections still do not appear to be drawn metal to metal, use a feeler gauge to measure any gaps at the locations identified in Figure 9. (Unless specified otherwise, gaps should be measured at these locations on both sides of the sections.) A maximum gap of .025" is acceptable. Measure gaps at the outer edge of the connection only, making sure not to puncture the gasket created by the silastic and rope.

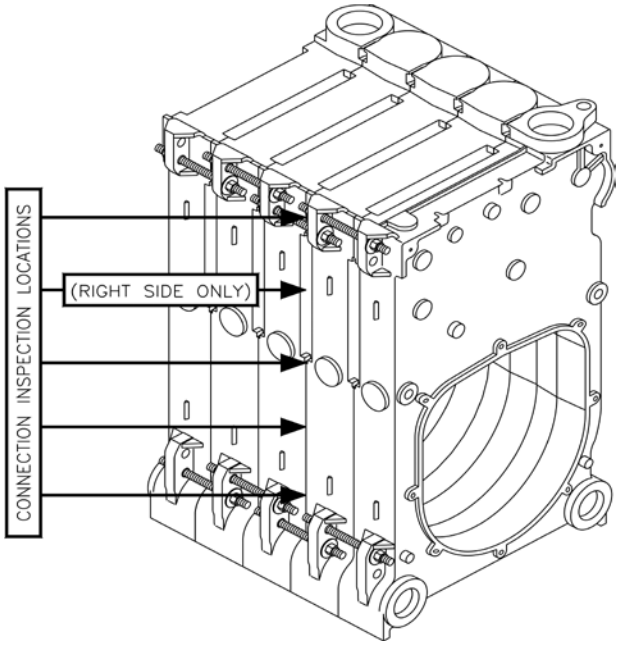


Figure 9: Connection Inspection Locations and Manual Draw-Up Tie Rod Pattern

NOTICE

When tightening the draw-up nuts, DO NOT EXCEED 150 FT-LB OF TORQUE. If the maximum torque limit has been reached and a gap greater than .025" still exists between the sections, consult the regional office.

KEEP NIPPLES ALIGNED WITH NIPPLE PORTS. If necessary, tap edge of nipples lightly with a blunt tool or rod to keep nipples from cocking while sections are being drawn-up. DO NOT DRAW UP SECTION WHEN NIPPLES ARE COCKED. If the torque required becomes excessive, periodically place a heavy block of wood over each nipple port and strike as squarely as possible with several blows to relieve tension on the draw-up rods.

n. CONTINUE ASSEMBLING SECTIONS IN THEIR RESPECTIVE ORDER alternating draw-up rods from the upper to lower set of holes in draw-up lugs (see Figure 13). Be certain that all sections are drawn up iron-to-iron at all three (3) nipple ports.

   BE SURE TO APPLY THE SEALANT to the groove in the ground joints between adjacent sections as the boiler operates with a positive pressure in the firebox and products of combustion will escape between sections unless the sections are properly sealed. The sealant should be applied before each section is placed on the assembly.

o. If a joint springs apart it must be redrawn tight within four (4) hours of the time of application of Silastic to that joint.

p. EXCESS LENGTH OF DRAW-UP RODS must not extend beyond front and rear section to ensure proper fit of jacket, adjust accordingly.

q. **After all sections have been drawn up, the draw-up rod nuts should be loosened until finger tight and then tightened ½ turn with a wrench.**

r. Now Proceed to Paragraph C of this Section, Hydrostatic Test.

2. ASSEMBLY OF SECTIONS (HYDRAULIC DRAW-UP)

   The entire boiler assembly may be drawn up at one time using hydraulic draw-up equipment providing the operation is completed within two (2) hours after application of the sealant.

   a. Repeat steps 1a through 1k under "Field Assembled Sections (Manual Draw-Up)."

   b. Continue driving sections in place (in their respective order) until all sections are in the assembly. Ground surfaces between adjoining sections should be spaced 1/4" to 3/8" apart. Spacing of more than 3/8" will limit number of sections that can be drawn up in one unit and could indicate cocked nipples.

⚠WARNING

Sealant must be properly applied to ALL boiler joints. Failure to properly seal the boiler joints will result in combustion gas leaks through to joint. DO NOT operate boiler with combustion gas leaks. The sealant should be applied before each section is placed on the assembly.

On long boiler assemblies, it may be necessary to draw-up a partial block if the entire boiler is not ready to be drawn-up tight within two (2) hours of the first application of Silastic. If the block assembly time extends overnight, the partial block completed must be drawn-up tight before leaving the boiler overnight. If a joint springs out, it must be redrawn tight within four (4) hours of first application of Silastic to the joint.

c. Insert the three (3) ¾" draw-up rods (and couplings, if appropriate) through the tapped holes in the rear section extending them through the tapped holes in the front section. Be sure to screw draw-up rods into couplings far enough to prevent stripping threads.

d. Place a 3" x 12" lg. steel channel on each end of the upper draw-up rod and a 3" x 8½" lg. steel channel on each end of the lower draw-up rods.

   Refer to Figures 10 and 11 for proper placement of channel block during assembly procedures. Install nuts and washers on one end of the draw-up rods and the hydraulic rams, washers and

draw-up rod clamps on the other. These items are all located in the Draw-Up Kit. See Figure 12.

NOTICE

Do not apply pressure directly on threaded tappings on front and rear sections with draw-up channels during assembly procedures.
Rods should be approximately centered in openings so that rods and couplings (when used) do not drag on pipe thread in end section tappings.

⚠WARNING

READ THE STATEMENTS BELOW BEFORE ATTEMPTING TO USE HYDRAULIC EQUIPMENT.
- **Release pressure in ram pumps before attempting to remove clamps.**
- **Do not stand in line with draw-up rods at either end when hydraulic pressure is being applied. As a safety measure, ends of draw-up rods should be covered while sections are being drawn in case rods should snap while under tension.**
- **Do not operate ram against draw-up coupling.**
- **Do not operate pump after ram has reached stroke limit.**

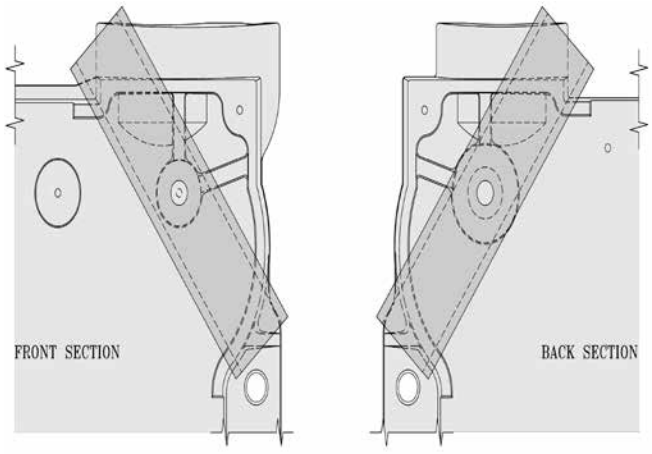


Figure 10: Front and Rear Section Channel Block Positions (Hydraulic Draw-Up)

e. Draw-Up Sections

Use hydraulic rams to draw up sections by applying pressure alternately on the draw-up rods. When rams reach stroke limit, release pressure in ram pumps and then move clamps to new position.

f. Continue to draw-up until all sections make contact at the ground joints.

g. After all sections have been drawn up, but before removing the hydraulic rams and draw-up rods, the 9¾" long tie rods must be installed.

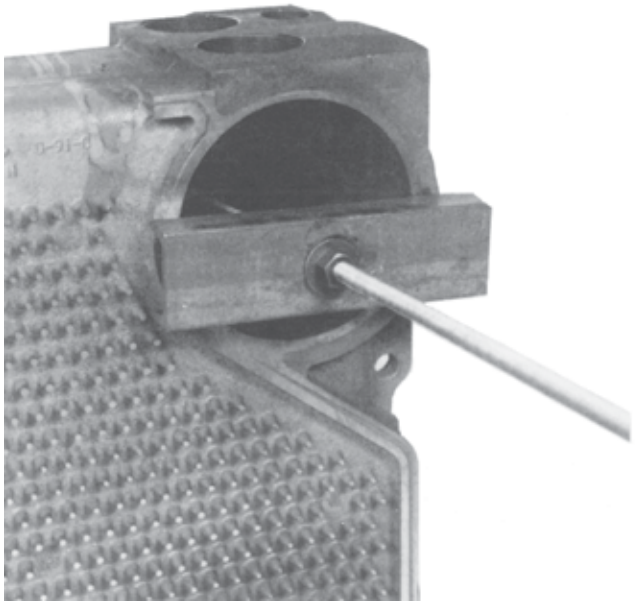


Figure 11: Center Section Channel Block Position (Partial Block Draw-Up)

The large draw-up rod lugs with dual holes cast in the four (4) corners of each casting. Starting with the upper holes in the back section, install four (4) 5/8" x 9¾" long tie rods along with washers and nuts. Continue installing the tie rods alternating from the upper to lower set of holes in draw-up lugs until front section is secured. Be certain that all sections are drawn up IRON TO IRON at all three nipple ports.

h. Excess length of draw-up rods must not extend beyond front and rear section to ensure proper fit of jacket, adjust accordingly. **Tighten all tie rod nuts until finger tight. Then tighten them an additional ½ turn with a wrench.**

C. HYDROSTATIC TEST — After the boiler sections have been assembled, it is essential that the boiler be hydrostatically tested before the canopy, flue cover plates, jacket, or piping is installed.

1. Tankless Heater Installation

   If boiler is ordered with tankless heaters, install heaters with the gaskets provided. Table IV gives the maximum number of heaters permissible per assembly and the heater ratings.

2. Plug all boiler tappings and fill boiler completely with cold water.

⚠ CAUTION

DO NOT install gauge until after hydrostatic testing the boiler. Gauge failure may result.

3. All completed boilers must satisfactorily pass the prescribed hydrostatic test.

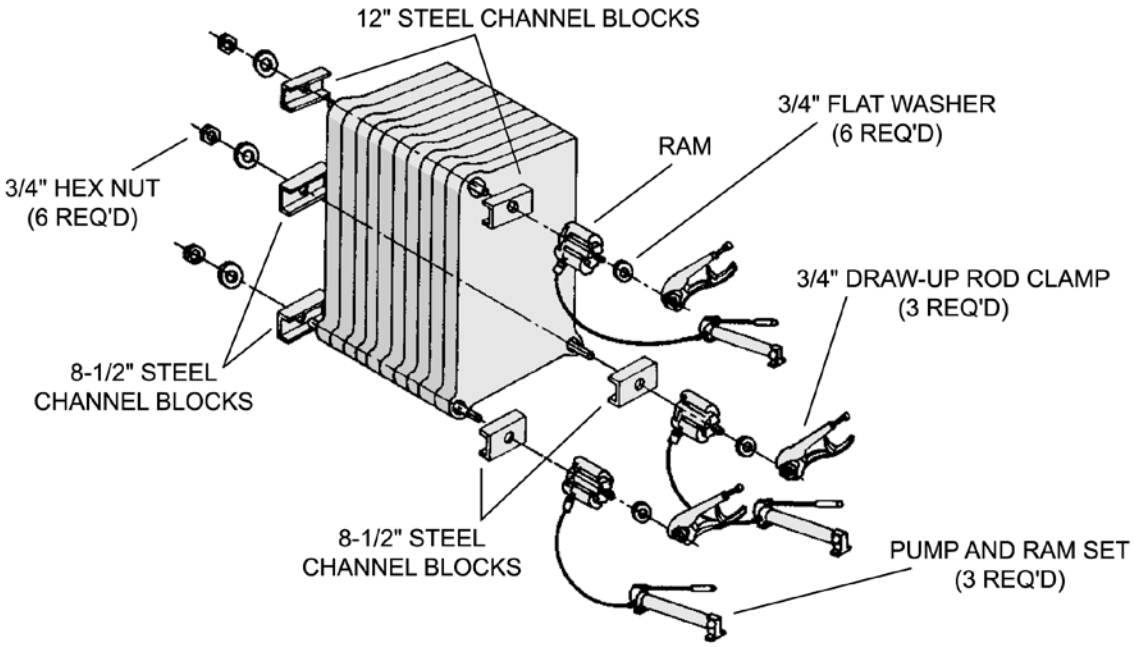


Figure 12: Hydraulic Draw-Up Sections

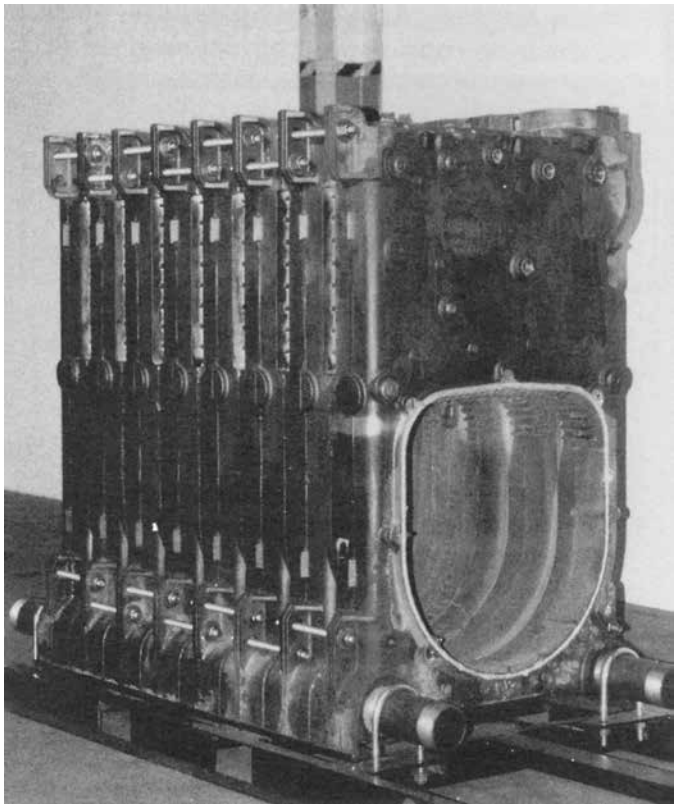


Figure 13: Boiler Section Assembly

a. STEAM BOILERS: The assembled boiler must be subjected to a hydrostatic test of 45 psig to 55 psig.

b. HOT WATER BOILERS: The assembled boiler must be subjected to a hydrostatic test of not less than 1½ times the maximum allowable working pressure, as established by the relief valve provided with the boiler. For example, a boiler with a 50 psi relief valve must be subjected to a test pressure of 75 psig to 85 psig.

⚠WARNING

Failure to properly hydrotest all boilers at the correct pressure may result in section assembly failure in operation.

4. EXAMINE BOILER CAREFULLY, INSIDE AND OUTSIDE, to insure against leaks from cocked nipples or through concealed breakage caused in shipping and handling. This precaution is for your protection and will simplify handling of necessary replacements and adjustment claims.
5. After making certain that there are no leaks, drain boiler and remove plugs for boiler trim and other connections.

A. INSTALL CANOPY/FLUE OUTLET ASSEMBLY, Refer to Figures 14, 15 and 16.

1. Open canopy carton.
2. Attach the two (2) canopy brackets to the front end cap of canopy with four (4) #10 x 1/2" sheet metal screws each.
3. Across the top of the front section and along the top ledges running back each side of the sections, place continuous 2" wide strips of cerafelt and overlap joints at front corners. Cerafelt strip should extend 1/4" beyond rear surface of back section. Cut off excess.
4. Place the canopy on the sections.
5. Position rear flange (end with studs) of canopy flush with rear surface of back section.
6. Loosely attach the canopy brackets to the lugs on the front section of the block assembly with 5/16" carriage bolts, flat washers and locknuts.
7. Check to see if rear flange of canopy is still flush with raised flange on back section.
8. Open either the rear flue outlet carton (standard) or top flue outlet carton (optional).
9. Attach the 1/8" x 1" wide self-adhesive fiber gasket to the surface of either the rear flue outlet damper assembly or rear flue outlet cover that mounts against the canopy and back section. Gasket must be centered over all attachment holes. Do not overlap corners, cut butt joints.
10. Attach either the rear flue outlet damper assembly or rear outlet canopy cover to the canopy with the 5/16" flat wasters, lock-washers and brass nuts and tighten securely. Attach the rear flue outlet damper assembly or cover to the back section with the four (4) 5/16" flat washers and cap screws and tighten securely.
11. Tighten front canopy carriage bolt until canopy is secure.
12. On the longer canopy sizes, Intermediate Mounting Brackets are provided, two (2) are required on sizes V907A thru V909A and four (4) are required on sizes V910A thru V912A. Refer to Figures 17 and 18.
    a. Intermediate brackets are shipped flat. Bend side flanges down approximately 90° as shown. Adjust bends until holes in bracket match hole pattern on canopy.
    b. Secure brackets to both sides of canopy with three (3) #10 x ½" sheet metal screws per bracket.
    c. Secure canopy left side bracket(s) with appropriate canopy 'J' bolt(s). Insert threaded end through holes in brackets and hook 'J' bolt

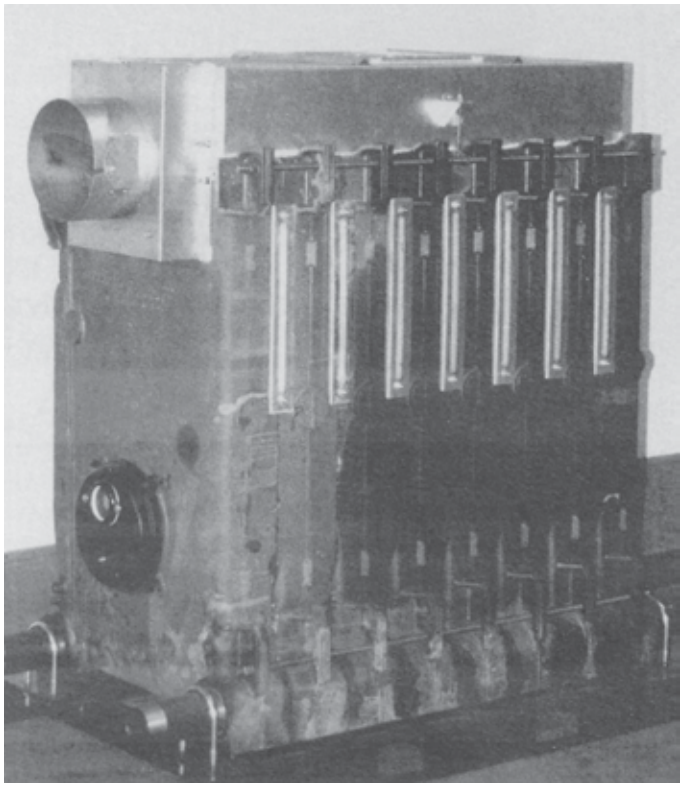


Figure 14: Canopy with Rear Flue Outlet Damper Assembly (Shown on optional steel shipping skid)

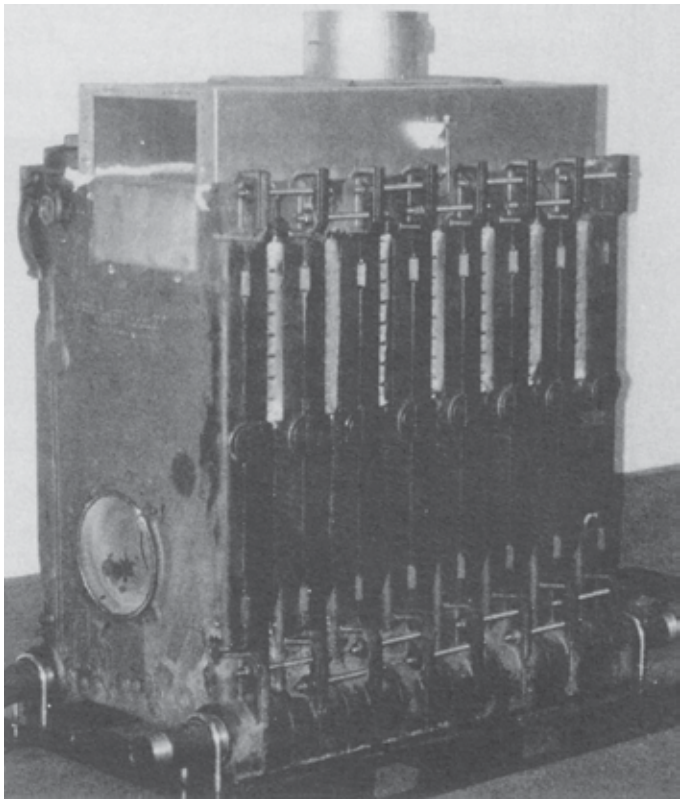


Figure 15: Canopy with Top Flue Outlet Damper Assembly (Rear Cover Removed) (Shown on optional steel shipping skid)

NOTE: FLUE TOP INSULATION NOT SHOWN.

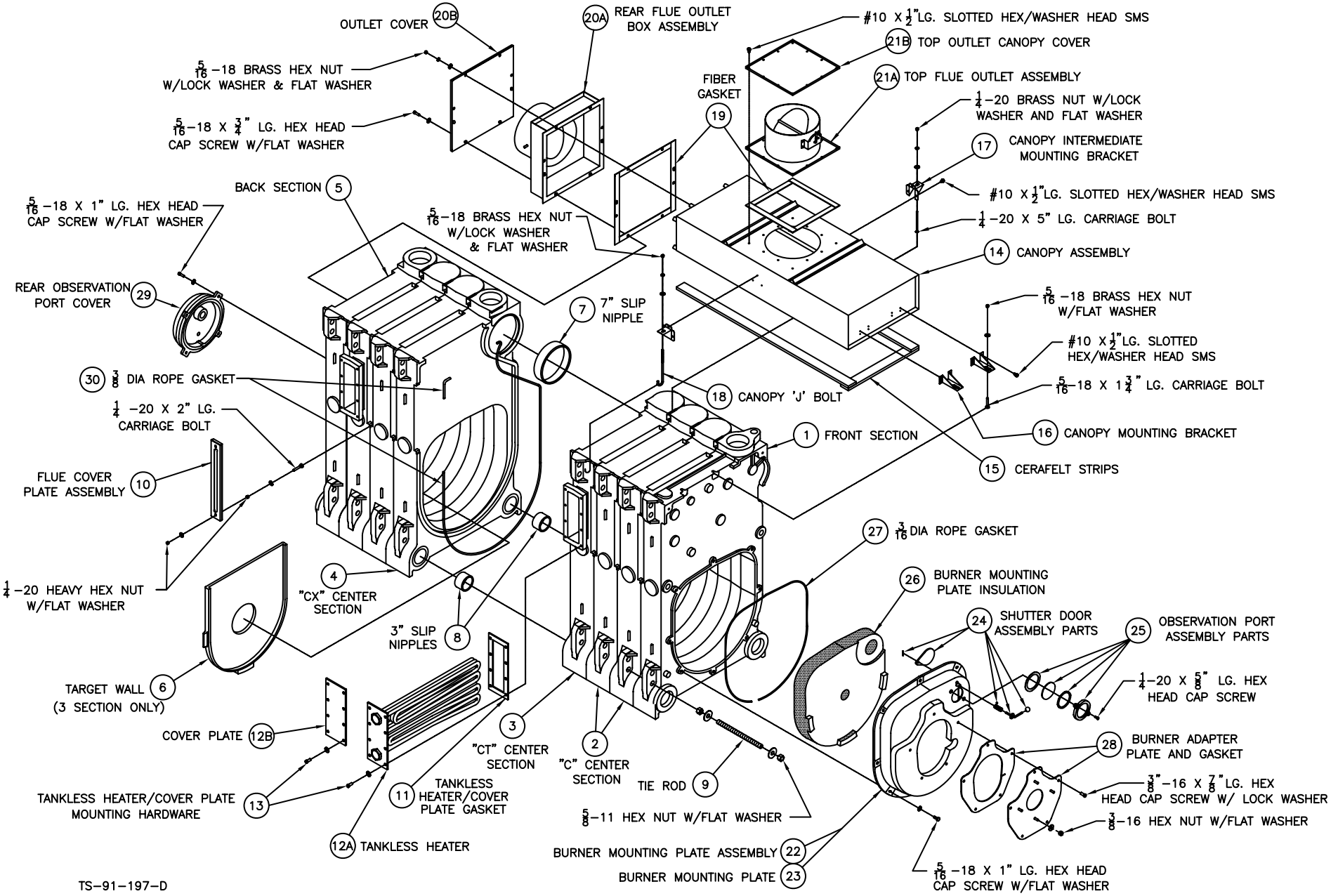


Figure 16: Bare Boiler Assembly

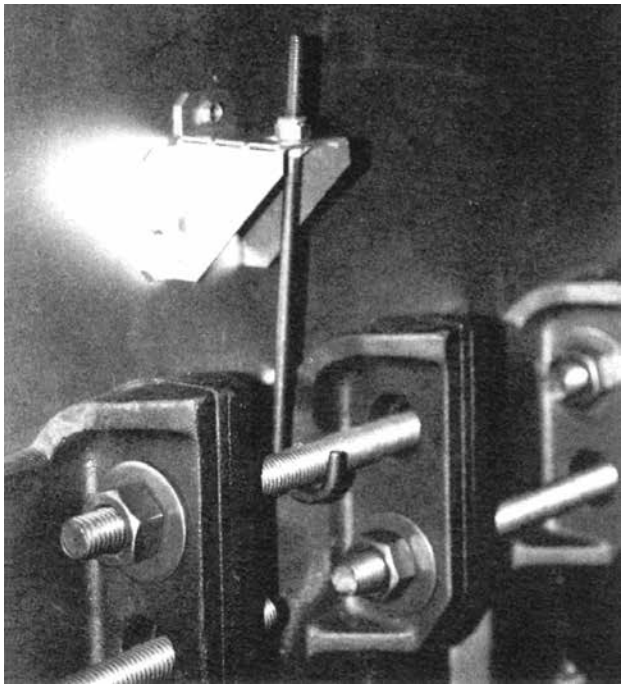


Figure 17: Left Side Canopy Intermediate Bracket

on center section draw-up rod (hooks should face outward). Secure canopy with 5/16" flat washers, lock washers and brass nuts. See Figure 17.

d. Secure canopy right side bracket(s) with ¼ - 20 x 5" lg. carriage bolts. Insert head of carriage bolt between canopy body and casting. Slide carriage bolt into slot provided between castings. Lower carriage bolt until threaded end will pass through hole in bracket. Secure canopy with ¼" flat washers, lock washers and brass nuts. See Figure 18.

13. Attach the 1/8" x 1" wide self-adhesive fiber gasket to the surfaces of either the top flue outlet damper assembly or top outlet canopy cover that mounts against the canopy. Gasket must be centered over all attachment holes. Do not overlap corners, cut butt joints.
14. Secure either the top flue outlet damper assembly or top outlet canopy cover with #10 x 1/2" sheet metal screws.

B. INSTALL FLUE COVER PLATES over cleanout openings on left side of boiler as shown in Figure 19. **See Important Product Safety Information on Page 21 of this manual, regarding refractory ceramic fiber product warning.**

1. Locate the cover plates, carriage bolts, nuts and washers in the boiler assembly carton(s).
2. Remove insulation from two (2) 3/8" diameter holes in flue cover plates using a 3/8" drill bit. Rotate bit through insulation by hand.
3. Attach the carriage bolts to the top and bottom of the flue openings with washers and hex nuts to provide a fixed stud.

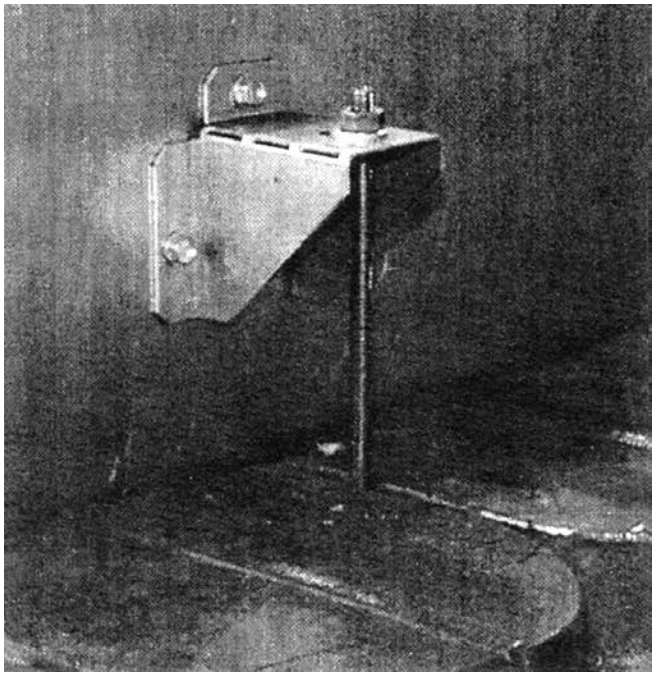


Figure 18: Right Side Canopy Intermediate Bracket

4. Install flue cover plates over studs with insulation against boiler and secure with washers and nuts. Tighten until insulation on cover plate provides a tight seal to casting. If after tightening, a gap is still evident where the sections join, apply silastic along top and bottom edge of insulation board.
5. Repeat steps 3 through 6 for mounting remaining flue cover plates.

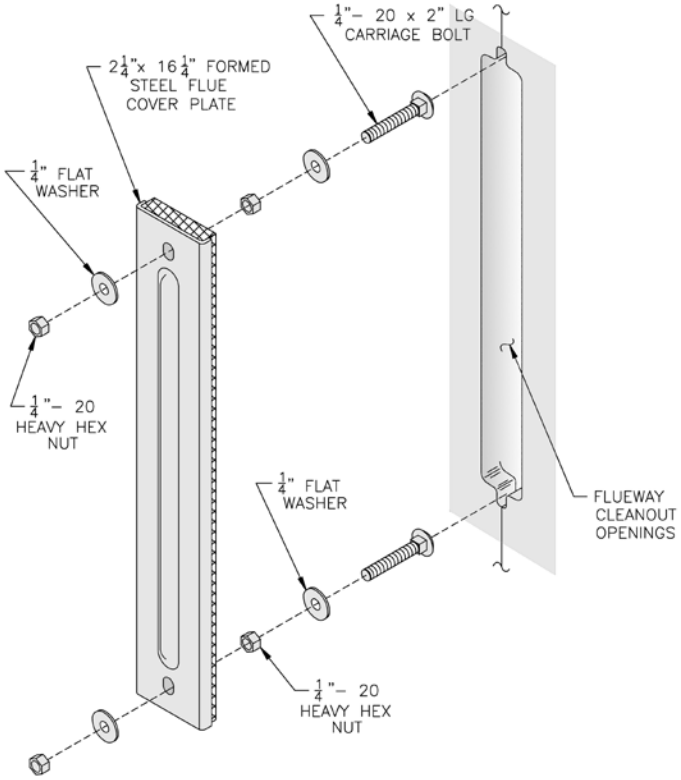


Figure 19: Flue Cover Plate Attachment

C. MOUNT REAR OBSERVATION PORT COVER

Refer to Figure 16.

1. With the silastic sealant, secure the 3/16" diameter rope gasket into the groove around the perimeter of the rear observation port cover.
2. Mount the rear observation port cover onto the rear section (with the word "Top" in the upright position) using the four (4) 5/16" - 18 x 1" lg. cap screws and flat washers provided.

D. INSPECT ALL BOILER SEALS

1. A visual inspection should be made of all sealed joints and repairs made as necessary. Darken the boiler room and place a light source in the combustion space and canopy to observe any gaps or open seals. Poor seals must be repaired and rechecked before continuing.

E. JACKET ASSEMBLY - See Figure 22 for Jacket Assembly Details.

1. Open jacket carton and jacket hardware package. Unless otherwise stated, all jacket components are fastened with #8 x ½" hex head sheet metal screws. Do not drive sheet metal screws tight until jacket assembly is complete.
2. On boilers with rear flue outlet damper assembly, remove square knockout from jacket rear panel. To remove knockout, use a single hacksaw blade with handle or aviation snips to cut metal tabs between slotted holes.
3. Attach jacket front panel to front section and jacket rear panel to back section using the eight (8) #10 x ½" self tapping screws. Tighten these screws securely.
4. Attach jacket lower tie bar panel (approximately 5-5/8" high) to the bottom of the jacket front and rear panels using four (4) sheet metal screws. Repeat for opposite side.
5. Attach jacket upper tie bar panel (approximately 4-1/8" high) to the top of the jacket front and rear panels using four (4) sheet metal screws. Repeat for opposite side.
6. Jacket Top Panel Attachment
   a. On boilers with top flue outlet damper assembly, remove octagon shaped knockout. To remove knockout, use a single hacksaw blade with handle or aviation snips to cut metal tabs between slotted holes.
   b. Remove knockout(s) for necessary supply piping in a similar manner.
   c. Attach jacket top panel to the front panel, rear panel and upper tie bar panels with sheet metal screws.
7. Install Jacket side Panels
   a. Snap black thumb hole bushings into all side panel holes.
   b. Use the left side panel and right side panel usage charts to determine correct positions of side panels. The three (3) digit panel identification numbers shown in the charts are also stamped along the bottom edge of each panel. Refer to Figures 20 and 21.
   c. Rearward and Intermediate panels have reverse bend flanges on one side of panel. These panels must be installed prior to forward panels.

NOTICE

To <u>install</u> multiple side panels, start at the rear of boiler and work forward. To <u>remove</u> panels, reverse order of assembly.

   d. If boiler is equipped with tankless heaters they should be installed at this time if they were not installed for hydrostatic test outlined on Page 18.
   e. Install right side panels into position by inserting top of panel into 'U' shaped channel, pushing bottom of panel in toward boiler, and sliding panel down into 'J' shaped channel. Repeat procedure until all right side panels are in place.
   f. Remove the knockouts necessary for tankless heater operation on left side panels.
   g. Install left side panels, using the same procedure used to install the right side panels.

JACKET LEFT SIDE PANEL USAGE CHART							
Boiler Model		MULTIPLE SIDE PANELS*					
		Panel No. 1	Panel No. 2	Panel No. 3	Panel No. 4	Panel No. 5	
V903A	REAR OF BOILER	L10	L5	---	---	---	FRONT OF BOILER
V904A		L10	L11	---	---	---	
V905A		L10	L17	---	---	---	
V906A		L10	L18	L5	---	---	
V907A		L10	L18	L11	---	---	
V908A		L10	L18	L17	---	---	
V909A		L10	L18	L18	L5	---	
V910A		L10	L18	L18	L17	---	
V911A		L10	L18	L18	L17	---	
V912A		L10	L18	L18	L18	L5	

* NOTE: To install multiple side panels, start at the rear and work forward. To remove panels, reverse order of assembly.

Figure 20: Left Side Panel Usage Chart

JACKET RIGHT SIDE PANEL USAGE CHART					
Boiler Model		SINGLE OR MULTIPLE SIDE PANELS*			
		Panel No. 3	Panel No. 4	Panel No. 5	
V903A	FRONT OF BOILER	---	---	R15 (Single)	REAR OF BOILER
V904A		---	---	R21 (Single)	
V905A		---	---	R27 (Single)	
V906A		---	---	R33 (Single)	
V907A		---	R15	R24	
V908A		---	R21	R24	
V909A		---	R27	R24	
V910A		---	R27	R30	
V911A		---	R33	R30	
V912A		R21	R24	R24	

* NOTE: To install multiple side panels, start at the rear and work forward. To remove panels, reverse order of assembly.

Figure 21: Right Side Panel Usage Chart

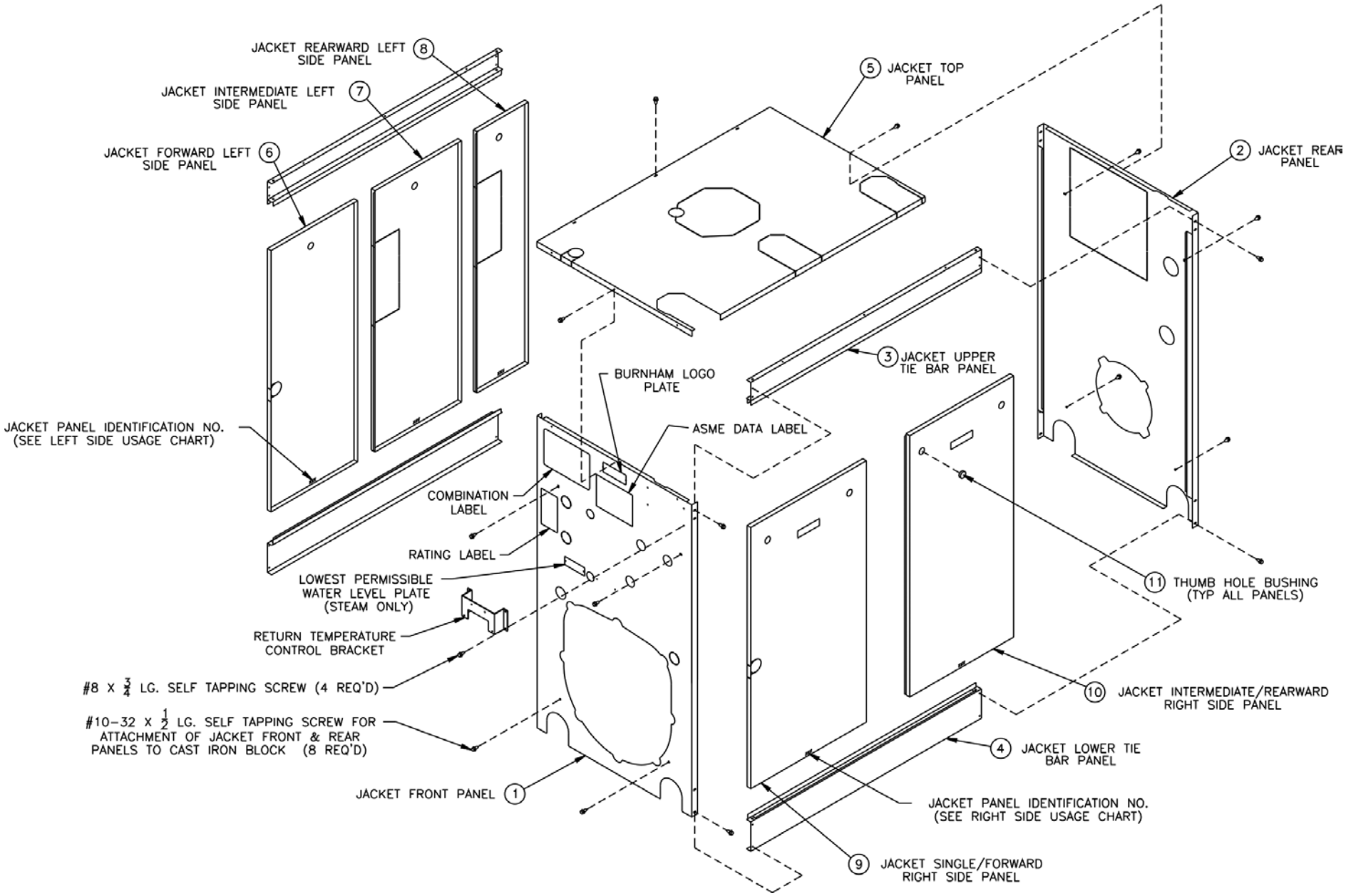


Figure 22: V9A Series Jacket Assembly (Boiler Models V903A thru V912A)

8. Combination Label and Burnham Logo Plate were attached to jacket front panel at time of manufacture. If loose or peeling, apply pressure to reset adhesive.
9. On steam boilers, attach lowest permissible water level plate (from steam trim carton) to the front panel using sheet metal screws.
10. Tighten all sheet metal screws to complete jacket assembly.

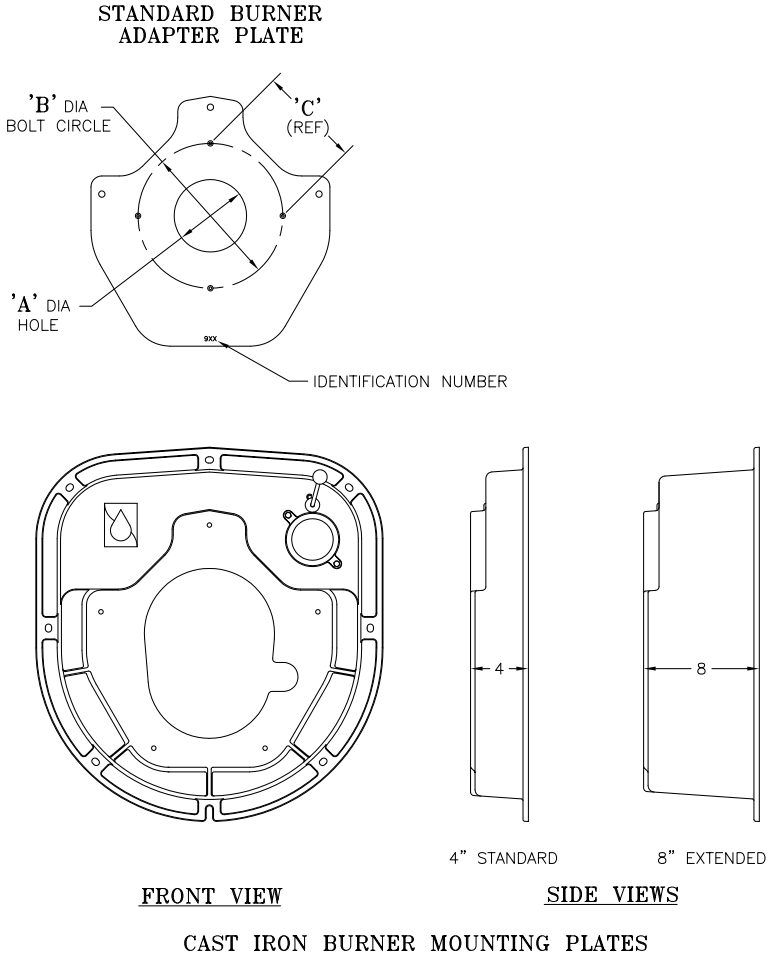
F. BURNER MOUNTING PLATE - Refer to Figures 16 and 23.

1. Using silastic sealant, secure the 3/16" diameter rope gasket to the groove along the mounting plate opening in the front section.
2. Install 5/16" x 1" lg. cap screw in lower tapping on front section to carry weight of burner mounting plate.
3. Engage bottom slot on burner mounting plate with matching bolt in bottom tapping of front section. Align mounting holes and fasten the mounting plate to the boiler sections with seven (7) remaining 5/16" cap screws and washers. Fully tighten all bolts.

G. MOUNT BURNER ADAPTER PLATE TO BURNER MOUNTING PLATE.

Refer to Figures 16 and 23. ALSO, REFER TO BURNER INSTALLATION MANUAL FOR INSTRUCTIONS SPECIFIC TO EACH BURNER.

1. In all cases, the burner adapter plate carton for the specified burner will be provided by Burnham.
2. Open Adapter Plate carton and remove contents. Apply four (4) small dabs of silastic on rear surface of adapter plate to temporarily hold gasket in place. Hold adapter plate in position against burner mounting plate, align holes and secure with five (5) 3/8" lock washers and 3/8" x 7/8" lg. cap screws.
3. USE A HOLE SAW OR KNIFE TO CUT BURNER MOUNTING PLATE INSULATION TO MATCH HOLE SIZE ON BURNER ADAPTER PLATE. After cutting, remove any and all loose pieces of insulation which may become lodged or interfere with the head of a burner air tube after insertion.
4. Confirm that hole in insulation fits snugly around burner blast tube. If hole is oversized, remove burner mounting plate (with burner attached) from boiler. Use additional fiberglass rope gasket provided with burner to fill in any space between



BECKETT ("CF" SERIES) BURNER ADAPTER PLATE

BOILER MODEL	PART NO.	I.D. NO.	'A' DIA.	'B' DIA.	'C' REF.
V903A THRU 905A	602292201	920	$4\frac{3}{4}$	10	$7\frac{1}{16}$
V906A THRU 908A	602292211	921	$6\frac{1}{8}$	10	$7\frac{1}{16}$
V909A THRU 912A	602292221	922	$6\frac{3}{4}$	10	$7\frac{1}{16}$

BECKETT ("CG" SERIES) BURNER ADAPTER PLATE

BOILER MODEL	PART NO.	I.D. NO.	'A' DIA.	'B' DIA.	'C' REF.
V903A THRU 906A	602292201	920	$4\frac{3}{4}$	10	$7\frac{1}{16}$
V907A THRU 908A	602292211	921	$6\frac{1}{8}$	10	$7\frac{1}{16}$
V909A THRU 911A	602292231	923	$7\frac{1}{4}$	10	$7\frac{1}{16}$
V912A	602292241	924	$8\frac{1}{8}$	10	$7\frac{1}{16}$

CARLIN ("CRD" SERIES) BURNER ADAPTER PLATE

BOILER MODEL	PART NO.	I.D. NO.	'A' DIA.	'B' DIA.	'C' REF.
V903A THRU 905A	602292301	930	$4\frac{1}{2}$	10	$7\frac{1}{16}$
V906A THRU 912A	602292311	931	$6\frac{1}{4}$	10	$7\frac{1}{16}$

POWER FLAME ("C" SERIES) BURNER ADAPTER PLATE

BOILER MODEL	PART NO.	I.D. NO.	'A' DIA.	'B' DIA.	'C' REF.
V904A THRU 907A	602292401	940	$7\frac{1}{2}$	$10\frac{1}{4}$	$7\frac{1}{4}$
V908A THRU 912A	602292411	941	9	$12\frac{1}{32}$	$8\frac{1}{2}$

POWER FLAME ("JR" SERIES) BURNER ADAPTER PLATE

BOILER MODEL	PART NO.	I.D. NO.	'A' DIA.	'B' DIA.	'C' REF.
V903A THRU 906A	602292451	945	$6\frac{3}{8}$	$10\frac{1}{4}$	$7\frac{1}{4}$
V907A THRU 909A	602292461	946	$8\frac{3}{8}$	$11\frac{25}{32}$	$8\frac{1}{4}$

WEBSTER ("JB" SERIES) BURNER ADAPTER PLATE

BOILER MODEL	PART NO.	I.D. NO.	'A' DIA.	'B' DIA.	'C' REF.
V905A THRU 912A	602292601	960	$7\frac{5}{8}$	$10\frac{3}{4}$	$7\frac{19}{32}$

RIELLO ("R" SERIES) BURNER ADAPTER PLATE

BOILER MODEL	PART NO.	I.D. NO.	'A' DIA.	'B' DIA.	'C' REF.
V903A THRU 905A	602293201	220	$5\frac{1}{8}$	$7\frac{7}{16}$	5.258
V906A THRU 911A	602293301	230	$6\frac{1}{2}$	$8\frac{13}{16}$	5.258
V912A	602293401	240	$7\frac{3}{4}$	$12\frac{3}{4}$	5.258

Figure 23: Burner Mounting Plate/Burner Adapter Plate Options

insulation and blast tube. If additional rope gasket is not provided with the burner, use 3/8" fiberglass rope rated for 2300°F (provided by others). Reinstall burner mounting plate when finished.

⚠ CAUTION

Failure to properly fill all gaps between the insulation and burner blast tube may result in damage to the burner.

5. For boilers without tankless heaters, proceed to Paragraph H (Install Steam Trim) or I (Install Water Trim).
6. For boilers with tankless heaters, install the tankless heater manifolds according to Figure 36.

H. STEAM BOILERS — INSTALL STEAM TRIM

Items for steam trim are located in the steam trim carton (except for the separately ordered low water cutoff and tankless heater control). Figure 24 shows the proper tappings for each item.

1. Install the gauge glass set.
2. Install the low water cut-off. Follow manufacturers instructions furnished with control.
3. Install the pressure limit control using the ¼" x 90 (1-7/8" x 4") extended leg syphon and the ¾" NPT x ¼" FPT hex bushing.

NOTICE

The L404 Pressure Limit contains mercury in a sealed tube. Do not place limit in the trash at the end of its useful life.
If this limit is replacing a limit that contains mercury in a sealed tube, do not place your old limit in the trash.
Contact your local waste management authority for instructions regarding recycling and the proper disposal of this limit, or of an old limit containing mercury in a sealed tube.
If you have questions, call Honeywell Inc. at 1-800-468-1502.

4. Level the pressure limit control by carefully bending the syphon until the control's leveling indicator hangs freely with its pointer directly over the index mark inside the back of the case.
5. Install the steam gauge using the ½" NPT x ¼" FPT hex bushing.
6. Install the safety valve as shown in Figure 38a. Safety valve must be installed in vertical position.
7. For boilers with tankless heaters, install the operating control in an unused tapping through one of the heater plates.

⚠WARNING

Safety valve discharge piping must be piped to within six (6) inches of floor, or to floor drain to eliminate potential of severe burns. Do not pipe in any area where freezing could occur. Do not install any shut-off valves, plugs or caps in discharge piping.

8. Plug extra boiler tappings.
9. Install required bottom blowoff/drain valve and connecting piping (supplied by others) per minimum piping requirements for steam boilers. See Figure 32.

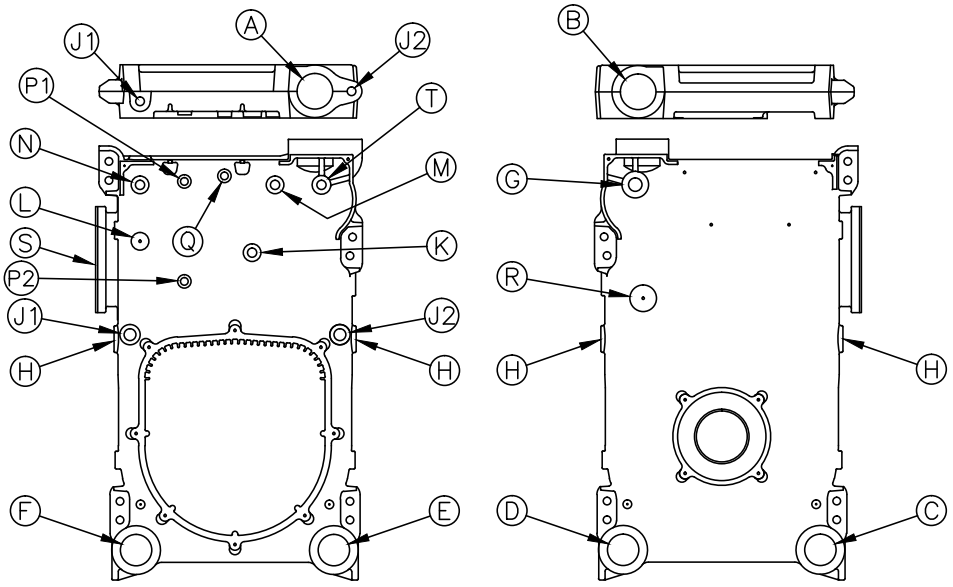
I. WATER BOILERS - INSTALL WATER TRIM

Items for water trim are located in the water trim carton (except for the separately ordered low water cutoff and tankless heater control). Figure 24 shows the proper tappings for each item.

1. Install the temperature pressure gauge.
2. Install the low water cutoff. Follow manufacturers instructions furnished with control.
3. Install the immersion well and mount the aquastat (limit control) onto the well.
4. Install the pressure relief valve as shown in Figure 38b. Relief valve must be installed in vertical position.
5. Plug extra boiler tappings.
6. Install required bottom blowoff/drain valve (supplied by others) per minimum piping requirements for water boilers, see Figure 26.

⚠WARNING

Relief valve discharge piping must be piped to within six (6) inches of floor, or to floor drain to eliminate potential of severe burns. Do not pipe in any area where freezing could occur. Do not install any shut-off valves, plugs or caps in discharge piping.



FRONT VIEW

BACK VIEW

TAPPING LOCATION	SIZE (INCHES)	STEAM BOILER	WATER BOILER
A	4	SUPPLY	SUPPLY
B	4	PLUG (903A THRU 906A) SUPPLY (907A THRU 912A)	PLUG
C	3	BLOW–OFF VALVE	RETURN
D	3	RETURN	PLUG (903A THRU 911A) RETURN (912A)
E	3	PLUG	BLOW–OFF / DRAIN VALVE
F	3	PLUG	PLUG
G	1½	SAFETY VALVE	RELIEF VALVE
H	1½	CROWN INSPECTION/WASHOUT (SPECIAL ORDER ONLY)	CROWN INSPECTION/WASHOUT (SPECIAL ORDER ONLY)
J1	1	FLOAT L.W.C.O.	FLOAT L.W.C.O.
J2	1	FLOAT L.W.C.O.	FLOAT L.W.C.O.

TAPPING LOCATION	SIZE (INCHES)	STEAM BOILER	WATER BOILER
K	¾	PROBE L.W.C.O. OR LOW FIRE HOLD CONTROL	PROBE L.W.C.O.
L	¾	AUXILIARY PROBE L.W.C.O. (SPECIAL ORDER ONLY)	AUXILIARY PROBE L.W.C.O. (SPECIAL ORDER ONLY)
M	¾	OPERATING PRESSURE LIMIT CONTROL	OPERATING TEMPERATURE LIMIT CONTROL
N	¾	HIGH PRESSURE LIMIT CONTROL/MANUAL RESET	HIGH TEMPERATURE LIMIT CONTROL/MANUAL RESET
P1	½	UPPER GAUGE GLASS CONNECTION	LOW FIRE HOLD CONTROL
P2	½	LOWER GAUGE GLASS CONNECTION	NOT USED – PLUG
Q	½	STEAM GAUGE (BUSH TO ¼")	TEMPERATURE/PRESSURE GAUGE
R	1½	INDIRECT WATER HEATER SUPPLY (SPECIAL ORDER ONLY)	————
S	¾	TANKLESS HEATER CONTROL	TANKLESS HEATER CONTROL
T	¾	FIRING RATE PRESSURE CONTROL	FIRING RATE TEMPERATURE CONTROL

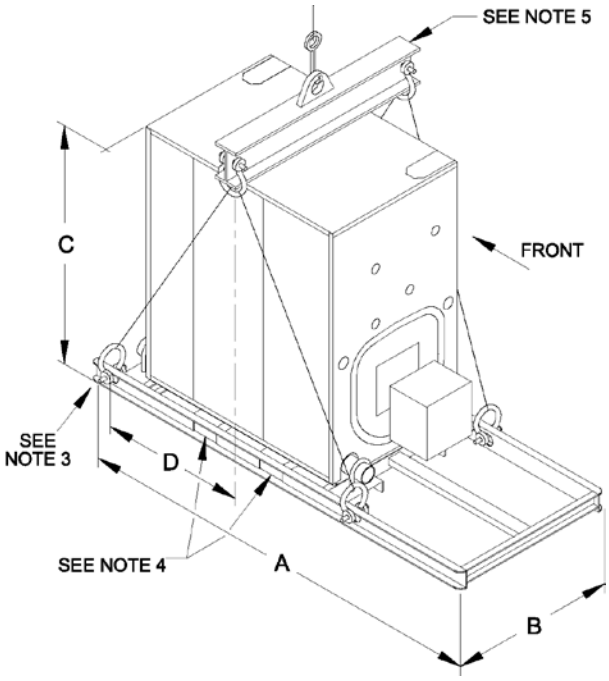
Figure 24: Purpose of Tappings

J. BURNER INSTALLATION

Refer to burner manufacturer's installation manual for proper installation, fuel piping, wiring, burner adjustment, burner start-up and service instructions. Consult Section VI of this manual for burner specifications and burner settings.

K. PACKAGED BOILER

1. The packaged boiler comes on it's own shipping skid (see Figure 25) and the assembled block is hydrostatically tested at the factory. Once the boiler is in it's final position, perform another hydrostatic test at 1½ times the working pressure of the boiler. Before boiler is put into service, all draw up rod nuts should be loosened and then retighten to finger tight plus 1/2 turn. The shipping skid can be used as a housekeeping pad unless local codes say otherwise. All controls are pre-wired down to the burner. If burner is equipped with a lead lag panel, lead lag controls will be shipped loose for header mounting. The power can be supplied to the burner if equipped with a control panel. If burner has no panel, the power is supplied to the J-box on the front jacket.
2. SUPPLY CONNECTIONS - Removal of top jacket is not required to connect the supply riser(s), however one may find it easier. Refer to Figure 26 or 27 for water boilers and Figure 32 for steam boilers.
3. RETURN CONNECTIONS - The boiler is secured to the shipping skid with U bolts and 3" shipping nipples. Remove the bolts and nipples. Using 3" plugs and an appropriate pipe sealant, plug the unused return connections according to the minimum piping recommendations. Refer to Figure 26 or 27 for water boilers and Figure 32 for steam boilers.
4. If the boiler burner unit was factory fire tested, the burner was adjusted to approximately 10% CO2 (gas) or 12% CO2 (oil) with an over fire pressure as listed in the Burner Specifications, Section VI of this manual. Final adjustments should be made once the unit is installed and adjusted.



Boiler Model	Number of Sections	Length A	Width B*	Height C**	Approx. Center of Gravity D***	Approx. Shipping Weight LBS***
V903A	3	63-5/8	34-1/2	61	17-1/2	1478
V904A	4	69-5/8	34-1/2	61	20-1/2	1790
V905A	5	75-5/8	34-1/2	61	23-1/2	2102
V906A	6	81-5/8	34-1/2	61	27-1/2	2418
V907A	7	87-5/8	34-1/2	61	30-1/2	2734
V908A	8	93-5/8	34-1/2	61	33-1/2	3071
V909A	9	105-5/8	34-1/2	61	37-1/2	3452
V910A	10	111-5/8	34-1/2	61	40-1/2	3809
V911A	11	117-5/8	34-1/2	61	43-1/2	4120
V912A	12	123-5/8	34-1/2	61	46-1/2	4447

* Width can vary with gas train configuration.
If the V9A packaged boiler must pass through a 36" doorway, please specify.

** Add 6-1/2" to dimension C when equipped with optional top outlet.

*** Varies slightly with burner and gas train configuration and with or without RTC.

1. Do not tilt. Exercise caution when lifting to avoid damage.
2. This boiler can be lifted by fork truck. Do not truck from front.
3. When lifting from rear, forks must extend beyond center of gravity and second skid cross bar.
4. When lifting from side, forks must extend to opposite skid rail and straddle center of gravity.
5. Cable spreader is to prevent jacket damage. Spreader width should equal B (width of skid) + 12". Adjust cable lengths to lift at approximate center of gravity per chart.

Figure 25: Shipping Information

L. BOILER PIPING - HEATING APPLICATIONS CONNECT SUPPLY AND RETURN PIPING TO HEATING SYSTEM

Connect supply and return piping to heating system (see Figures 26 through 32). Flow direction for hot water boilers must be from the rear return out through the top front supply. Steam boilers can pipe return to the front as an alternate location. Some boiler sizes may require the use of additional supply and return tappings. Check Figure 24 and applicable piping diagram for the boiler size you are installing.

⚠WARNING

Failure to properly pipe boiler may result in improper, unsafe system operation and void manufacturer's warranty.
DO NOT improperly pipe boiler.

⚠WARNING

All steam and hot water pipes must have clearances of at least 1/2" from all combustible construction.

⚠WARNING

A hot water boiler installed above radiation level must be provided with a low water cutoff device as part of the installation.

1. HOT WATER HEATING - This boiler must be installed in strict accordance with this installation manual Deviations from these installation instructions may void manufacturer's warranty.

⚠WARNING

Continued boiler operation for prolonged periods of time under conditions when temperature differential across the system exceeds 40°F and/or, return water temperature stays below 135°F, may result in premature boiler failure due to flue gas condensation and/or thermal shock.

a. If the boiler is used in connection with refrigeration systems, boiler must be installed with chilled medium piped in parallel with heating boiler using appropriate valves to prevent chilled medium from entering boiler. See Figure 35.

b. If the boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air, boiler piping must be equipped with flow control valves to prevent gravity circulation of boiler water during cooling system operation.

c. Burnham Commercial recommends maintaining temperature differential (drop) across the system at 40°F or less, and return water temperature at minimum of 135°F for optimum operation and long-term reliability.

i. If minimum return water temperature can

be maintained at 135°F and temperature differential across the system is at 40°F or less, refer to Figure 26 or 27 for recommended minimum boiler piping details.

ii. If minimum return water temperature cannot be maintained at 135°F or the temperature differential across the system varies, a blend pump is recommended as a minimum to help protect the boiler from flue gas condensation and/or thermal shock. See piping details in Figure 28. Primary secondary piping with a by-pass is an alternate to the blend pump method and is shown in Figure 29.

d. If conditions exist where the boiler is subjected to prolonged periods of operating conditions below 135°F, other mixing methods such as three or four way valves or variable speed injection should be used. Burnham Commercial offers an RTC Return Temperature Control kit to protect the boiler. See separate RTC manual.

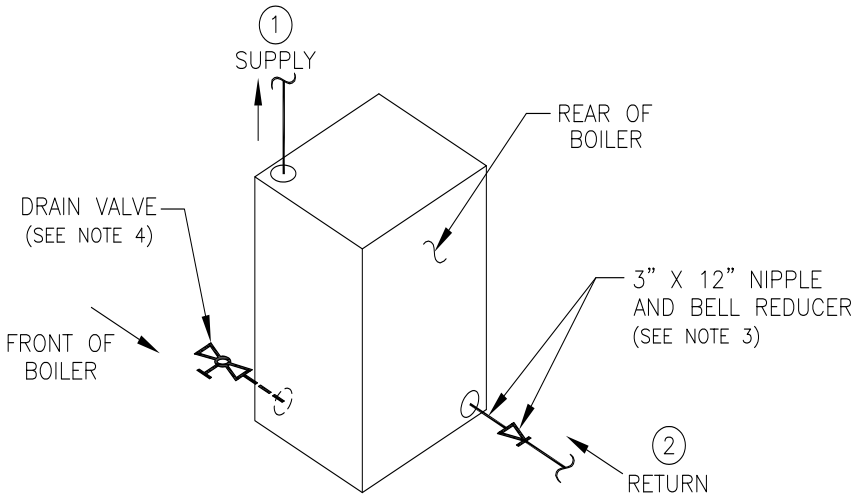
e. Multiple Boilers - Recommended minimum multiple boiler piping is shown in Figure 30 as primary secondary with a by-pass. The boiler circulator will maintain a constant flow through the boiler during every heat demand while the by-pass diverts a portion of hot water back to the return. Alternate minimum multiple boiler piping is shown in Figure 31. The blend pump will maintain constant flow through the boiler during every heat demand and provide a hot water blend back to the return.

f. Glycol Antifreeze Solutions - Many systems today use ethylene or propylene glycol antifreeze solutions as a measure for freeze protection, as well as a pump lubricator and corrosion inhibitor. The properties of the glycol mixture have an impact on valve and pump sizing. All glycol solutions have a lower specific heat than water. This means that the glycol solution cannot transfer heat as well as pure water, resulting in the need for higher flow rates. In addition, the viscosity of the glycol solution is usually higher than water, requiring a higher pump head for the same given flow. Consult factory for specific applications, pump selection and flow rate.

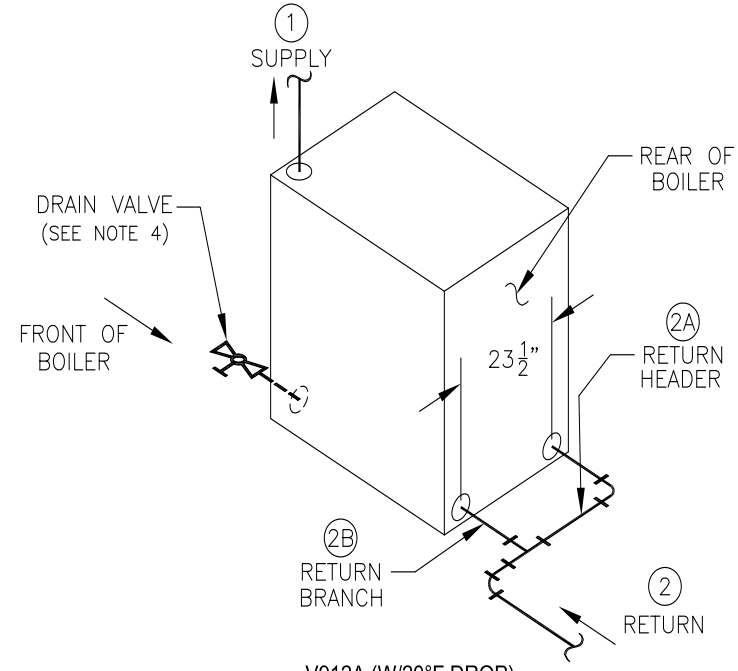
NOTICE

A properly constructed Hartford Loop must be installed on all gravity return steam systems. Hartford Loop is not required on pumped return systems.

2. STEAM HEATING - For piping details, see Figure 32. Figure 33 shows a typical pumped return/boiler feed unit arrangement. Figure 34 illustrates the required elevations for McDonnell and Miller 150 and 63 float low water cut-offs.



V903A THRU V911A (W/20°F DROP)
V903A THRU V912A (W/40°F DROP)



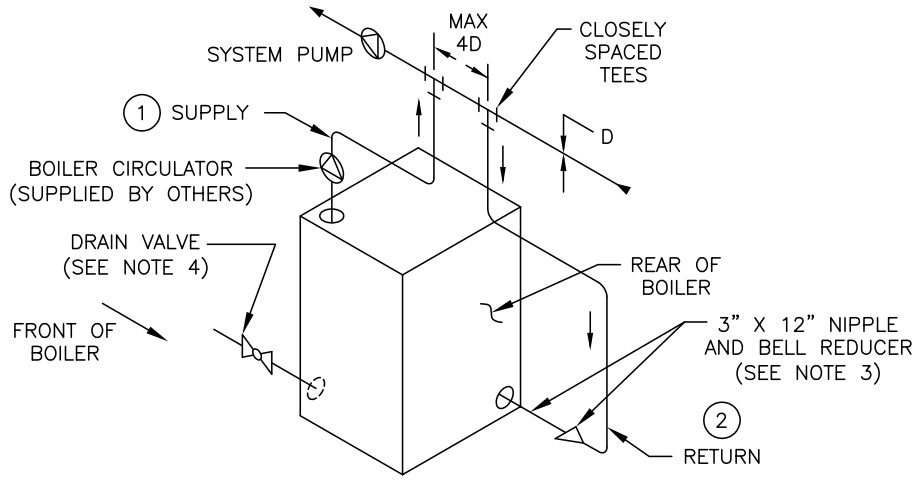
V912A (W/20°F DROP)

BOILER MODEL	SUPPLY PIPING SIZE (1)		RETURN PIPING SIZE			
			(2) RETURN		(2A) RETURN HEADER	(2B) RETURN BRANCH (QTY)SIZE
	20°F DROP	40°F DROP	20°F DROP	40°F DROP	20°F DROP	20°F DROP
V903A	2"	1 1/2"	2"	1 1/2"	—	—
V904A	2"	1 1/2"	2"	1 1/2"	—	—
V905A	2"	1 1/2"	2"	1 1/2"	—	—
V906A	2 1/2"	1 1/2"	2 1/2"	1 1/2"	—	—
V907A	2 1/2"	2"	2 1/2"	2"	—	—
V908A	2 1/2"	2"	2 1/2"	2"	—	—
V909A	3"	2"	3"	2"	—	—
V910A	3"	2 1/2"	3"	2 1/2"	—	—
V911A	3"	2 1/2"	3"	2 1/2"	—	—
V912A	4"	2 1/2"	4"	2 1/2"	3"	(2) 3"

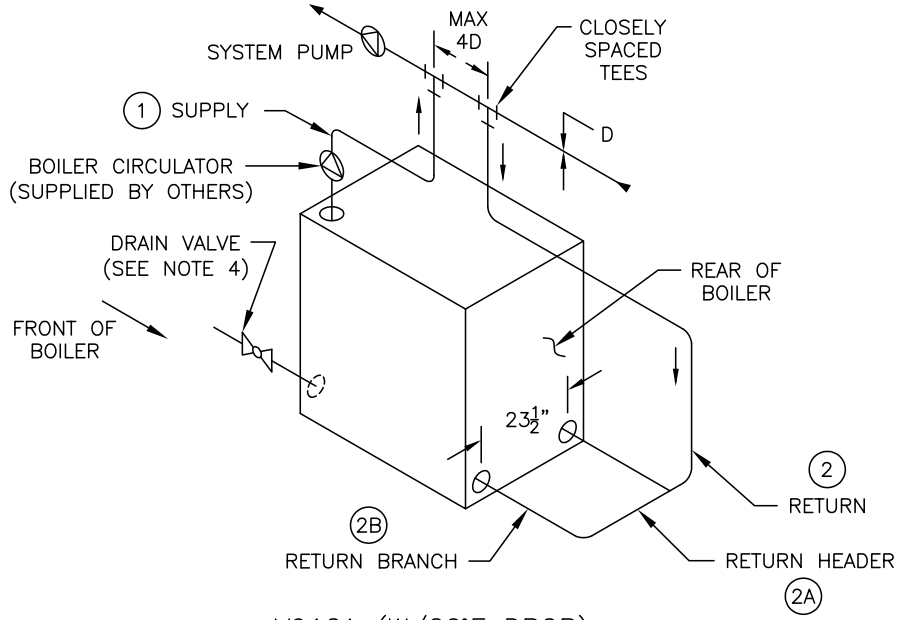
NOTES:

1. ALL PIPING IS SCHEDULE 40.
2. PIPE SIZES LISTED ARE BASED ON A 20°F OR 40°F DIFFERENTIAL (TEMPERATURE DROP). SELECT ONE TO MATCH APPLICATION.
3. WHEN SPECIFIED RETURN PIPING SIZE IS LESS THAN 3", INSTALL 3" X 12" NIPPLE AND APPROPRIATE SIZE BELL REDUCER DIRECTLY INTO BOILER RETURN TAPPING AS SHOWN.
4. BALL VALVE PREFERABLE, GATE VALVE ACCEPTABLE ALTERNATIVE (SUPPLIED BY OTHERS).
   - MINIMUM VALVE SIZE PER ASME CODE: 3/4" NPT.

Figure 26: V9A Series Minimum Piping - Parallel - Water Boiler



V903A THRU V911A (W/20°F DROP)
V903A THRU V912A (W/40°F DROP)

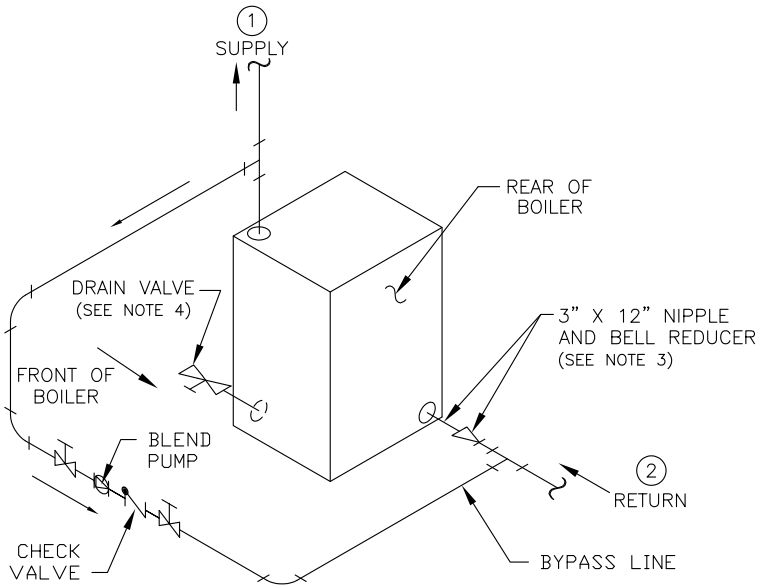


V912A (W/20°F DROP)

MODEL	SUPPLY PIPING SIZE (1)		RETURN PIPING SIZE			
			RETURN (2)		RETURN HEADER (2A)	RETURN BRANCH (QTY) SIZE (2B)
	20°F DROP	40°F DROP	20°F DROP	40°F DROP	20°F DROP	20°F DROP
V903A	2"	1 1/2"	2"	1 1/2"	--	--
V904A	2"	1 1/2"	2"	1 1/2"	--	--
V905A	2"	1 1/2"	2"	1 1/2"	--	--
V906A	2 1/2"	1 1/2"	2 1/2"	1 1/2"	--	--
V907A	2 1/2"	2"	2 1/2"	2"	--	--
V908A	2 1/2"	2"	2 1/2"	2"	--	--
V909A	3"	2"	3"	2"	--	--
V910A	3"	2 1/2"	3"	2 1/2"	--	--
V911A	3"	2 1/2"	3"	2 1/2"	--	--
V912A	4"	2 1/2"	4"	2 1/2"	3"	(2) 3"

NOTES:
1. ALL PIPING IS SCHEDULE 40.
2. PIPE SIZES LISTED ARE BASED ON A 20°F OR 40°F DIFFERENTIAL (TEMPERATURE DROP). SELECT ONE TO MATCH APPLICATION.
3. WHEN SPECIFIED RETURN PIPING SIZE IS LESS THAN 3", INSTALL 3" X 12" NIPPLE AND APPROPRIATE SIZE BELL REDUCER DIRECTLY INTO BOILER RETURN TAPPING AS SHOWN.
4. BALL VALVE PREFERABLE, GATE VALVE ACCEPTABLE ALTERNATIVE (SUPPLIED BY OTHERS).
   • MINIMUM VALVE SIZE PER ASME CODE: 3/4" NPT.

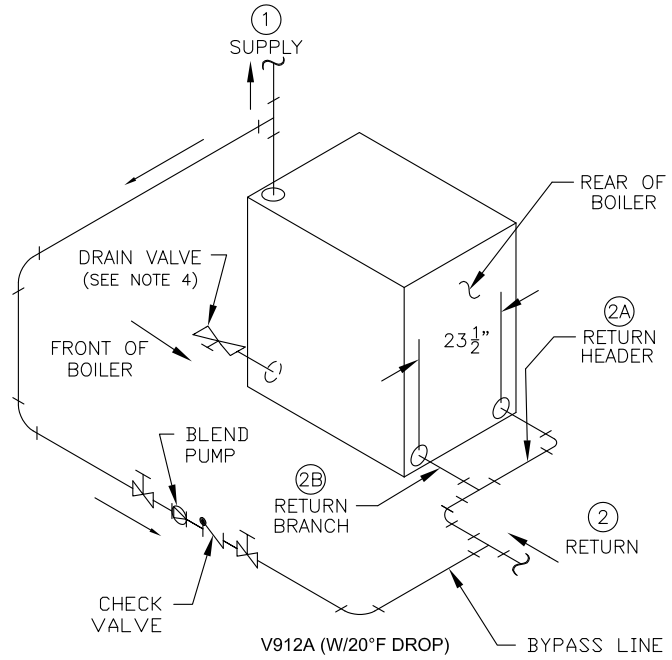
Figure 27: V9A Series Minimum Piping - Primary Secondary - Water Boiler



V903A THRU V911A (W/20°F DROP)
V903A THRU V912A (W/40°F DROP)

BOILER MODEL	BOILER HP	GROSS OUTPUT (MBH)	BLEND PUMP GPM ⚠1	BLEND PUMP LINE SIZE	SUPPLY PIPING SIZE (1)		RETURN PIPING SIZE			
							(2) RETURN		(2A) RETURN HEADER	(2B) RETURN BRANCH (QTY)SIZE
					20°F DROP	40°F DROP	20°F DROP	40°F DROP	20°F DROP	20°F DROP
V903A	10.4	347	5.2	1"	2"	1½"	2"	1½"	—	—
V904A	14.4	483	7.2	1"	2"	1½"	2"	1½"	—	—
V905A	19.3	646	9.7	1¼"	2"	1½"	2"	1½"	—	—
V906A	24.1	808	12.0	1¼"	2½"	1½"	2½"	1½"	—	—
V907A	28.6	959	14.3	1¼"	2½"	2"	2½"	2"	—	—
V908A	33.2	1110	16.6	1¼"	2½"	2"	2½"	2"	—	—
V909A	40.1	1342	20.0	1½"	3"	2"	3"	2"	—	—
V910A	45.6	1528	22.8	1½"	3"	2½"	3"	2½"	—	—
V911A	51.2	1714	25.6	1½"	3"	2½"	3"	2½"	—	—
V912A	56.8	1900	28.4	2"	4"	2½"	4"	2½"	3"	(2) 3"

⚠1 USE 3 FT OF HEAD FOR PUMP SIZE SELECTION.

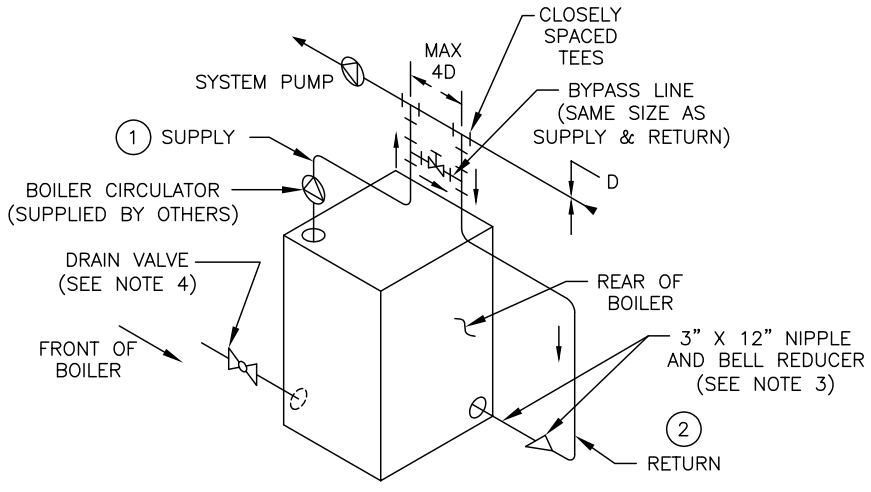


V912A (W/20°F DROP)

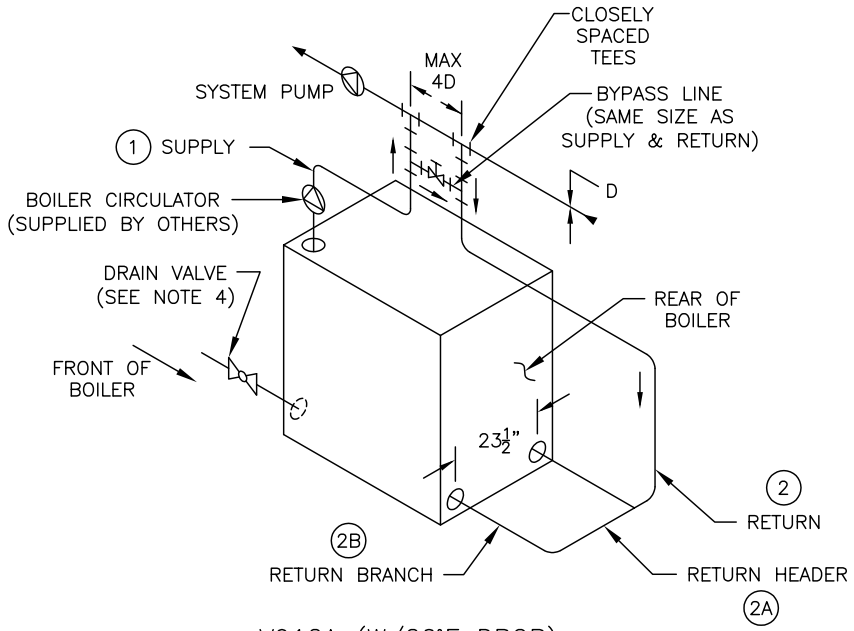
NOTES:

1. ALL PIPING IS SCHEDULE 40.
2. PIPE SIZES LISTED ARE BASED ON A 20°F OR 40°F DIFFERENTIAL (TEMPERATURE DROP). SELECT ONE TO MATCH APPLICATION.
3. WHEN SPECIFIED RETURN PIPING SIZE IS LESS THAN 3", INSTALL 3" X 12" NIPPLE AND APPROPRIATE SIZE BELL REDUCER DIRECTLY INTO BOILER RETURN TAPPING AS SHOWN.
4. BALL VALVE PREFERABLE, GATE VALVE ACCEPTABLE ALTERNATIVE (SUPPLIED BY OTHERS).
   - MINIMUM VALVE SIZE PER ASME CODE: ¾" NPT.

Figure 28: V9A Series Minimum Piping Details, Bypass with Blend Pump - Water Boiler



V903A THRU V911A (W/20°F DROP)
V903A THRU V912A (W/40°F DROP)



V912A (W/20°F DROP)

MODEL	SUPPLY PIPING SIZE (1)		RETURN PIPING SIZE			
			RETURN (2)		RETURN HEADER (2A)	RETURN BRANCH (QTY) SIZE (2B)
	20°F DROP	40°F DROP	20°F DROP	40°F DROP	20°F DROP	20°F DROP
V903A	2"	1 1/2"	2"	1 1/2"	--	--
V904A	2"	1 1/2"	2"	1 1/2"	--	--
V905A	2"	1 1/2"	2"	1 1/2"	--	--
V906A	2 1/2"	1 1/2"	2 1/2"	1 1/2"	--	--
V907A	2 1/2"	2"	2 1/2"	2"	--	--
V908A	2 1/2"	2"	2 1/2"	2"	--	--
V909A	3"	2"	3"	2"	--	--
V910A	3"	2 1/2"	3"	2 1/2"	--	--
V911A	3"	2 1/2"	3"	2 1/2"	--	--
V912A	4"	2 1/2"	4"	2 1/2"	3"	(2) 3"

NOTES:
1. ALL PIPING IS SCHEDULE 40.
2. PIPE SIZES LISTED ARE BASED ON A 20°F OR 40°F DIFFERENTIAL (TEMPERATURE DROP). SELECT ONE TO MATCH APPLICATION.
3. WHEN SPECIFIED RETURN PIPING SIZE IS LESS THAN 3", INSTALL 3" X 12" NIPPLE AND APPROPRIATE SIZE BELL REDUCER DIRECTLY INTO BOILER RETURN TAPPING AS SHOWN.
4. BALL VALVE PREFERABLE, GATE VALVE ACCEPTABLE ALTERNATIVE (SUPPLIED BY OTHERS).
   • MINIMUM VALVE SIZE PER ASME CODE: 3/4" NPT.

Figure 29: V9A Series Minimum Piping - Primary Secondary/with Bypass - Water Boiler

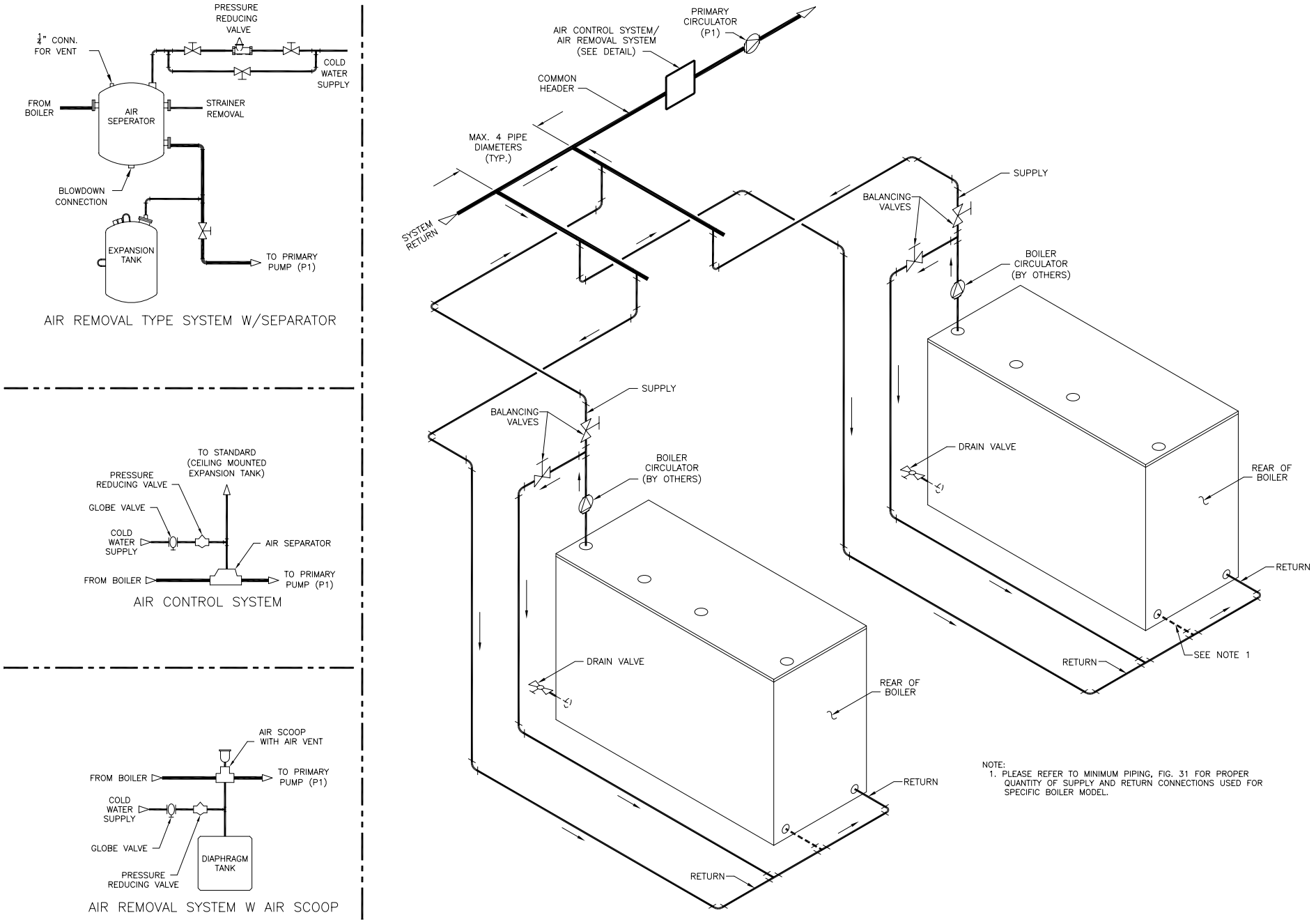
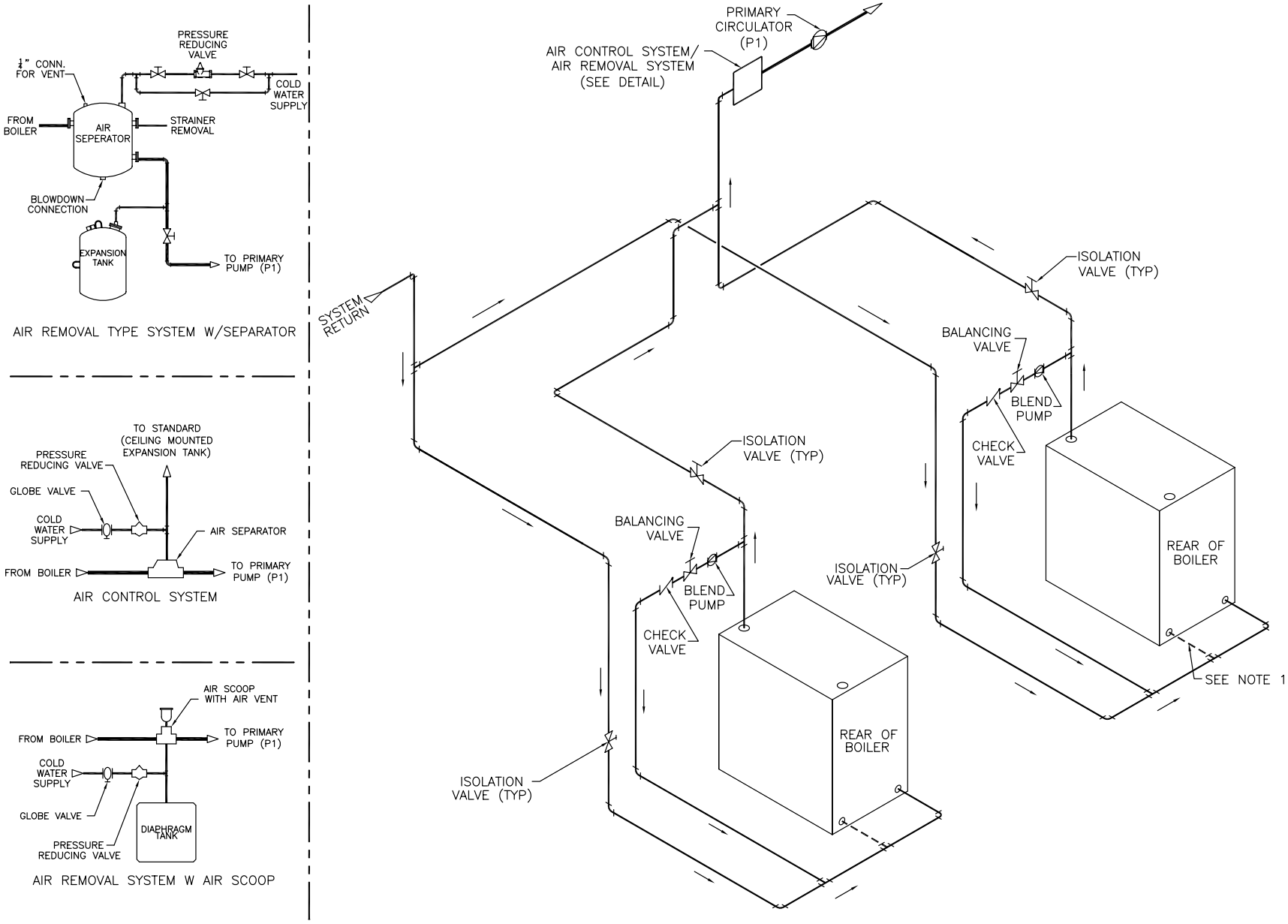
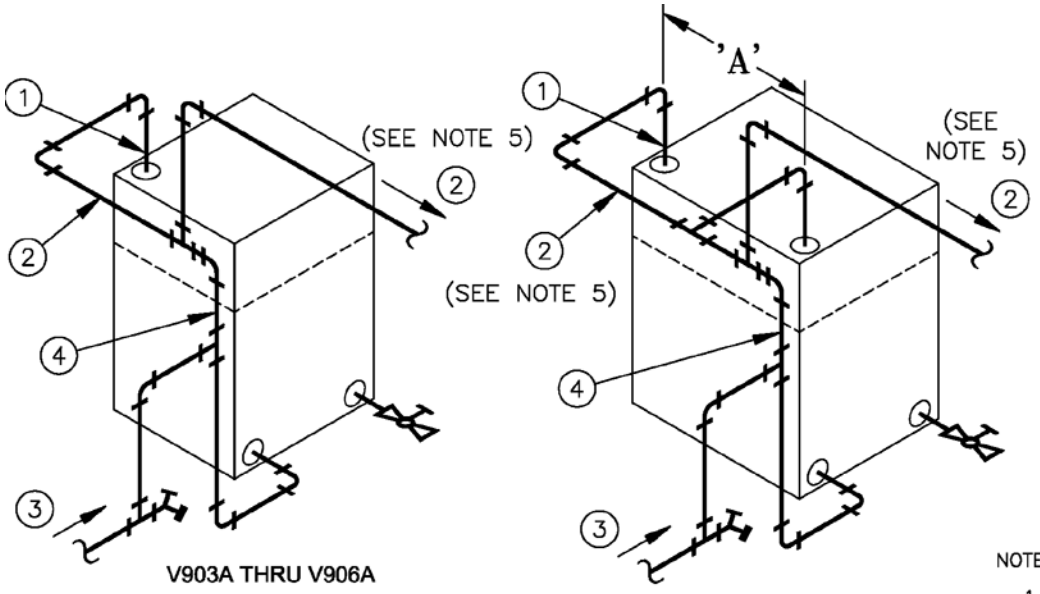


Figure 30: Minimum Piping Details - Multiple Boiler Application, Primary/Secondary Piping With Bypass



NOTE:
1. PLEASE REFER TO MINIMUM PIPING, FIG. 31 FOR PROPER QUANTITY OF SUPPLY AND RETURN CONNECTIONS USED FOR SPECIFIC BOILER MODEL.

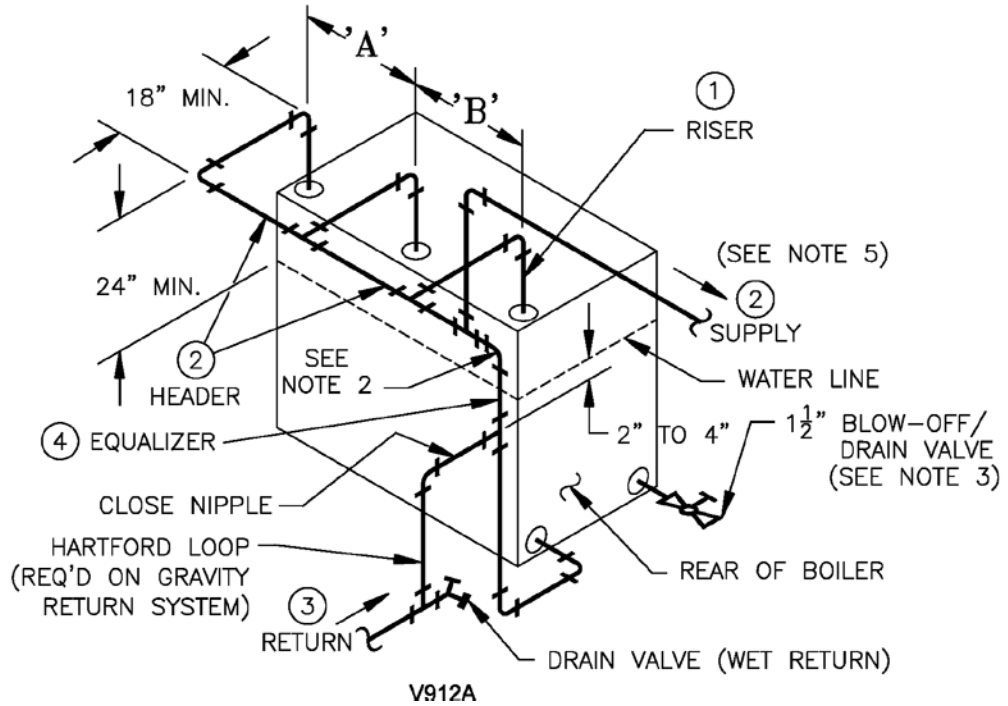
Figure 31: Minimum Piping Details - Multiple Boiler Application, Parallel Piping With Blend Pump



V903A THRU V906A

V907A THRU V911A

BOILER MODEL	PIPING SIZE				RISER SPACING	
	① RISER (QTY)SIZE	② HEADER & SUPPLY	③ RETURN	④ EQUALIZER	'A'	'B'
V903A	(1) 3"	3"	1½"	2"	—	—
V904A	(1) 4"	4"	2"	2"	—	—
V905A	(1) 4"	4"	2"	2"	—	—
V906A	(1) 4"	4"	2½"	2½"	—	—
V907A	(2) 4"	6"	2½"	2½"	36"	—
V908A	(2) 4"	6"	2½"	2½"	42"	—
V909A	(2) 4"	6"	2½"	2½"	48"	—
V910A	(2) 4"	6"	3"	3"	54"	—
V911A	(2) 4"	6"	3"	3"	60"	—
V912A	(3) 4"	6"	3"	3"	30"	36"



V912A

NOTES:

1. ALL PIPING IS SCHEDULE 40.
2. TO PREVENT CONDENSATE FROM BEING TRAPPED IN HEADER, DO NOT REDUCE EQUALIZER ELBOW AT HEADER CONNECTION.
3. BALL VALVE PREFERABLE, GATE VALVE ACCEPTABLE ALTERNATIVE. (SUPPLIED BY OTHERS)
   - MINIMUM VALVE SIZE PER ASME CODE: ¾" NPT 903A/905A; 1" NPT 906A/910A; 1¼" NPT 911A/912A.
   - INCREASING THE VALVE SIZE WILL IMPROVE THE BLOWDOWN OPERATION.
   - IN ALL CASES, PIPING CONNECTING BLOWOFF VALVE TO BOILER SHALL BE FULL SIZE TO THE POINT OF DISCHARGE.
4. HEADER PIPING MAY BE RUN OVER TOP OF BOILER IF SPACE DOES NOT ALLOW FOR PIPING ARRANGEMENT SHOWN. INCREASED SERVICE REQUIREMENTS WILL RESULT HOWEVER.
5. SUPPLY FROM BOILER HEADER MUST BE CONNECTED BETWEEN THE FIRST BOILER RISER AND THE HEADER DRIP (OR HARTFORD LOOP). DO NOT CONNECT SUPPLY BETWEEN RISERS OR OPPOSITE END OF BOILER HEADER.

Figure 32: Minimum Piping Requirements For Gravity Return V9A Series Steam Boilers

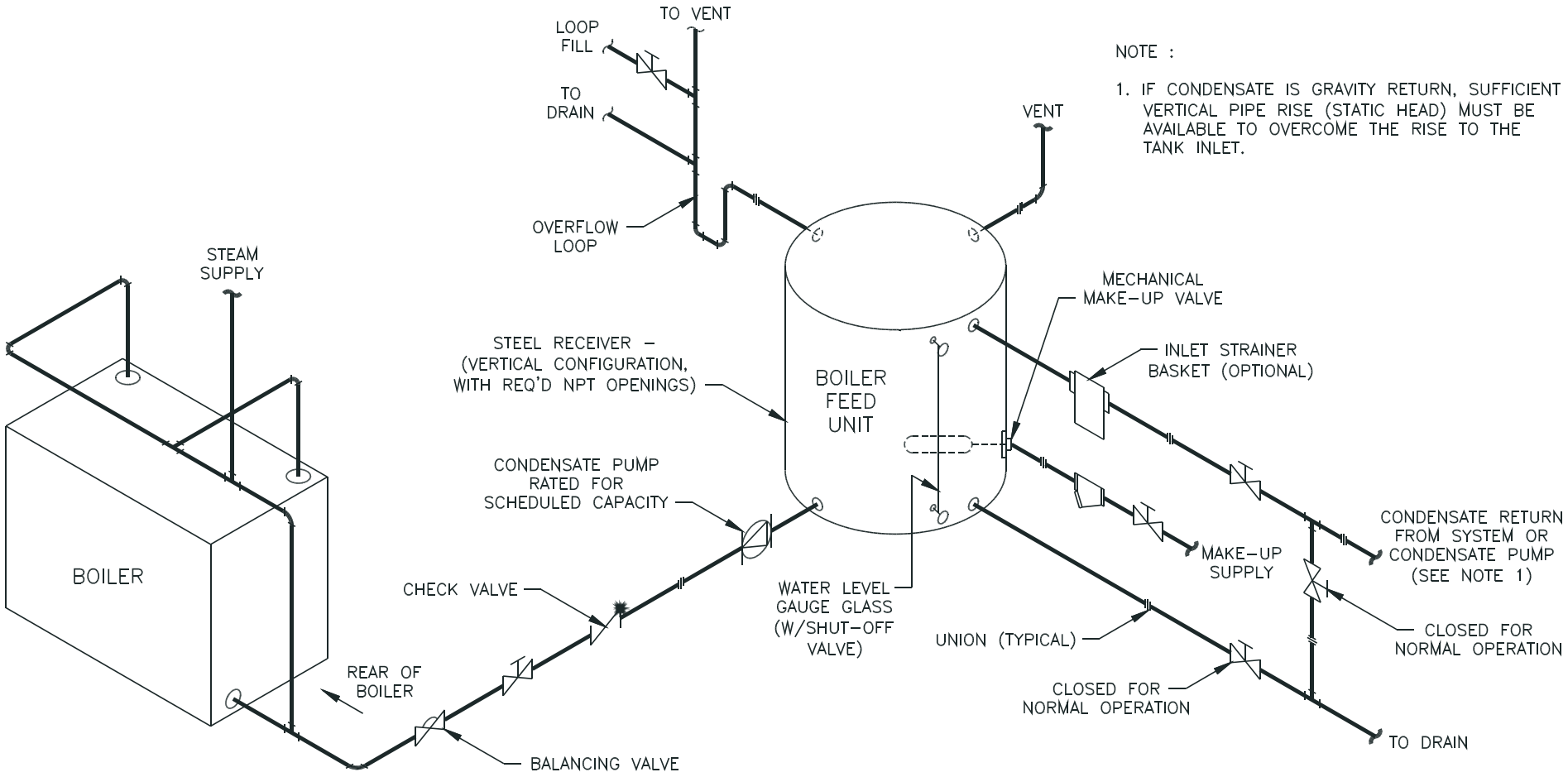


Figure 33: Typical Steam Piping Arrangement for Boilers with Pumped Condensate Return and Boiler Feed Unit

M. BOILER PIPING, DOMESTIC HOT WATER (DHW) APPLICATION – The V9A boiler can be used in many different piping applications to produce Domestic Hot Water (DHW). In some applications, depending on the control strategy (outdoor reset, setpoint operation, etc.) and size of boiler, it is recommended to isolate the space heating load from the DHW load. For example, if the domestic load is more than the space heating load, it is beneficial to dedicate one or more boilers solely to DHW production and one or more other boilers to solely space heating, since during mild weather conditions, the boiler(s) will have more capacity than is required. Piped in the recommended manner, the space heating boiler(s) can be shut down during the summer months to conserve energy and to avoid short cycling. This section will address four methods of piping and controlling domestic hot water generation.

1. Hot Water Boiler/Tankless Coil(s) - Tankless coils, mounted into the side of the boiler, have been used successfully for many years and may be used in single and multiple boiler applications. When a boiler is arranged with tankless coils, it is not recommended that outdoor reset be used, unless there are control systems in place to prevent overheating of the space heating zones.

   Figure 37a depicts the addition of an automatic mixing valve to the tankless heater piping to obtain a dual temperature domestic system. The mixing valve provides tempered water to the fixtures, while the branch prior to the valve provides high temperature water for dishwashing, washing machines and other appliances.

2. Hot Water Boiler/Tankless Coils/Storage Tank - This application involves the use of several tankless coils piped in parallel, emptying into a large storage tank, and is typically used in larger DHW production applications, such as hotel showers and laundries. See Figure 37b for recommended piping and wiring details for this type of application. The tempering valve and recirculation loop are advantageous in these applications, because they provide both high temperature and tempered domestic hot water to the system, eliminating the need to purge and waste water until it reaches the desired temperature. In the case where the boiler is used for domestic production only, and there is no space heating involved, a destratification pump is utilized to provide flow within the boiler. This flow acts as a means of preventing the hot water from stratifying at the top of the boiler. Destratification pump flow rates are given in the table in Figure 37b.

3. Hot Water Boiler/Indirect Water Heater - The use of indirect water heaters for domestic hot water generation is common and somewhat advantageous over tankless coils alone, since they also provide DHW storage. A tempering valve and recirculating pump are again recommended for a dual temperature system, to provide a constant temperature to the fixtures without waiting for cooler water to warm up. Figure 37c shows a typical indirect heater piping application with no space heating. Indirect pump flow rates are calculated based on a 20°F ΔT.

NOTICE

DO NOT use the boiler circulator as an indirect domestic hot water system circulator.

4. Steam Boiler/Indirect Water Heater – Use the Indirect Water Supply tapping, "R" (Special Order Only – see Figure 24) when connecting an Indirect Water Heater directly to the boiler.

NOTICE

When possible, domestic hot water production should utilize a dedicated boiler(s). This will allow the other boiler(s) to be shut down and isolated during the summer months. If the boiler load is shared between heating and domestic hot water, then one needs to determine if a hot water priority is required. If a priority is not selected, erratic domestic hot water production may result during the beginning and end of every heating season. Conversely, a priority for domestic hot water production may cause a significant heating zone activation delay, in an improperly balanced system. Parallel piping conversions may require isolation from the heating system to prevent system flow influence on DHW performance. Consult a qualified system heating professional to design for the proper application.

N. CONNECT TANKLESS HEATER PIPING as shown in Figure 37a. See Table IV for Tankless Heater Ratings.

NOTICE

The following guidelines should be followed when piping the tankless heater:

1. Install Flow Regulator

   If flow through the heater is greater than its rating, the supply of adequate hot water may not be able to keep up with the demand. For this reason a FLOW REGULATOR matching the heater rating should be installed in the cold water line to the heater. Refer to Figure 37a for piping recommendations. Locate the flow regulator below the inlet (cold water side) of the heater and a minimum of 36" away from the inlet so that the regulator is not subjected to excess temperatures during "off" periods when it is possible for heat to be conducted back through the supply line. The flow regulator will limit the flow of supply water regardless of inlet pressure variations ranging from 20 to 125 psi.

2. Install Water Temperature Mixing Valve

⚠WARNING

Install a mixing valve at the tankless heater outlet to avoid risk of burns or scalding due to excessively hot water at fixtures. Do not operate the boiler when equipped with a tankless heater unless mixing valve is operating properly.

Refer to Figure 37a for piping recommendations. Adjust and maintain the mixing valve in accordance with manufacturers instructions.

Installation of a mixing valve will also lengthen the delivery of the available hot water by mixing some cold water with the hot. In addition, savings of hot water will be achieved since the user will not waste as much hot water while seeking desired water temperature. Higher temperature hot water required by dishwashers and automatic washers is possible by piping the hot water from the heater prior to entering the mixing valve. An electric hot water booster can also be used. The mixing valve should be "trapped" by installing it below the cold water inlet to heater to prevent lime formation in the valve.

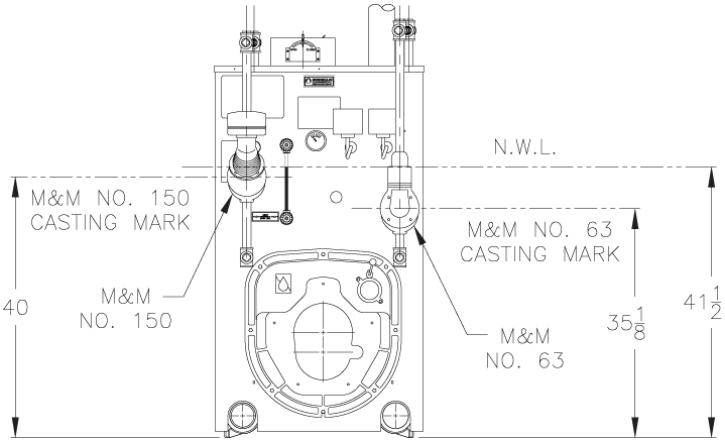


Figure 34: Mounting Elevations of M&M 150 and 63 Float Low Water Cut-Offs

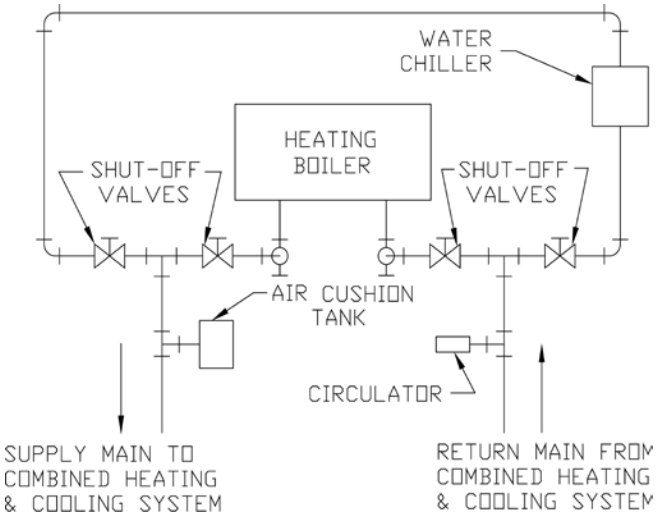


Figure 35: Recommended Piping for Combination Heating & Cooling (Refrigeration) Systems Water Boilers

3. Flushing of Heater

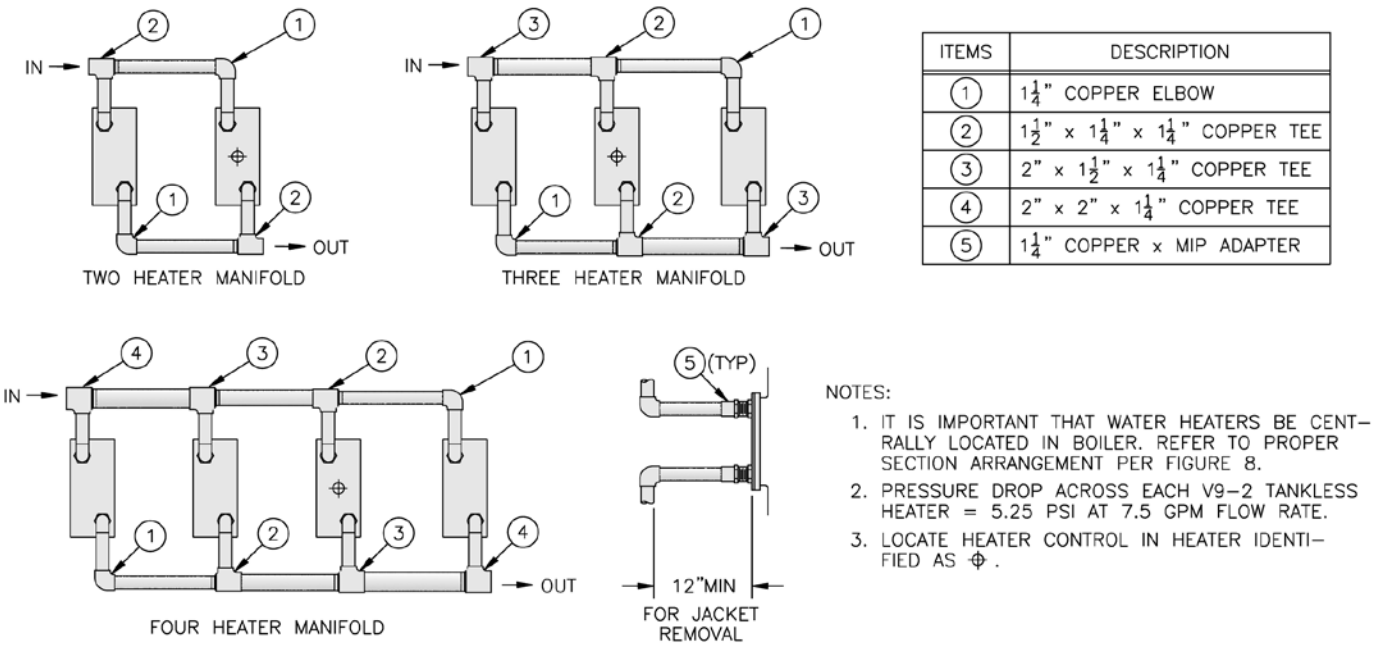
   All water contains some sediment which settles on the inside of the coil. Consequently, the heater should be periodically backwashed. This is accomplished by installing hose bibs as illustrated in Figure 37a and allowing water at city pressure to run into hose bib A, through the heater, and out hose bib B until the discharge is clear. The tees in which the hose bibs are located should be the same size as heater connections to minimize pressure drop.

4. Hard Water

   A water analysis is necessary to determine the hardness of your potable water. This is applicable to some city water and particularly to well water. An appropriate water softener should be installed based on the analysis and dealer's recommendation. This is not only beneficial to the tankless heater but to piping and fixtures plus the many other benefits derived from soft water.

⚠ CAUTION

Do not operate tankless heater with hard water. Tankless failure will result. Install water softener if hard water is present.



ITEMS	DESCRIPTION
1	1¼" COPPER ELBOW
2	1½" x 1¼" x 1¼" COPPER TEE
3	2" x 1½" x 1¼" COPPER TEE
4	2" x 2" x 1¼" COPPER TEE
5	1¼" COPPER x MIP ADAPTER

NOTES:

1. IT IS IMPORTANT THAT WATER HEATERS BE CENTRALLY LOCATED IN BOILER. REFER TO PROPER SECTION ARRANGEMENT PER FIGURE 8.
2. PRESSURE DROP ACROSS EACH V9-2 TANKLESS HEATER = 5.25 PSI AT 7.5 GPM FLOW RATE.
3. LOCATE HEATER CONTROL IN HEATER IDENTIFIED AS ⊕.

Figure 36: Minimum Piping Requirements for V9A Tankless Heater Manifolds

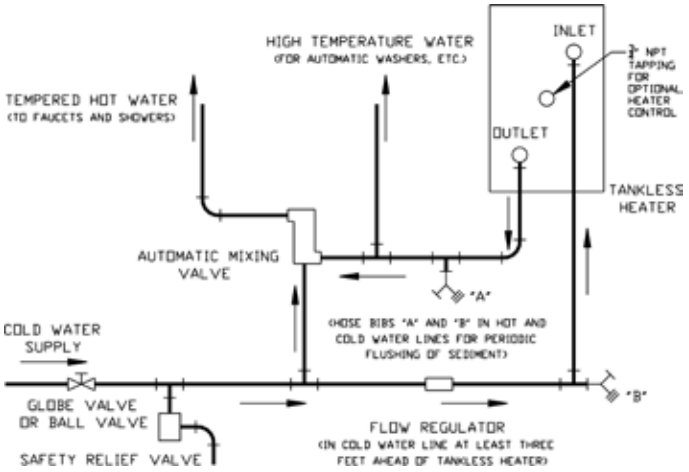


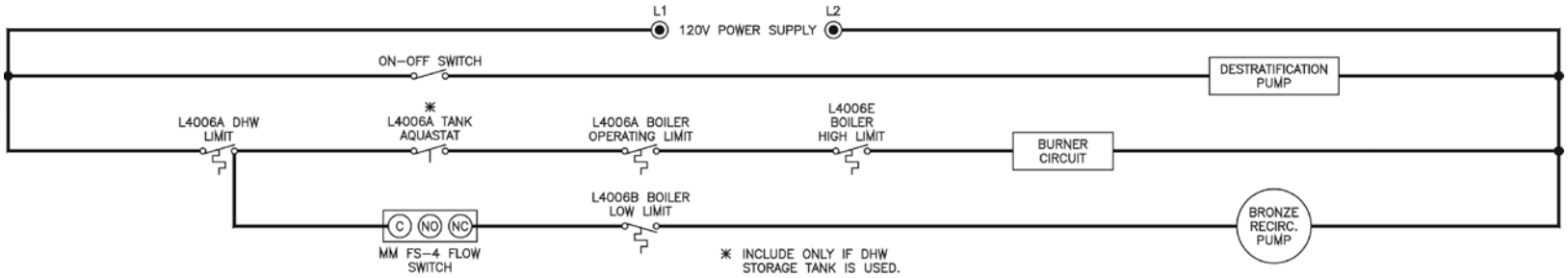
Figure 37a: Schematic Tankless Heater Piping

Table IV: Tankless Heater Ratings

Boiler Model	Number of V9-2 Tankless Heaters Installed			
	1	2	3	4
V903A	6.75	---	---	---
V904A	7.5	---	---	--
V905A	7.5	---	---	---
V905A	7.5	---	---	---
V906A	7.5	15	---	---
V908A	7.5	15	---	---
V909A	7.5	15	22.5	---
V910A	7.5	15	22.5	---
V911A	7.5	15	22.5	---
V912A	7.5	15	22.5	30

Notes:

1. Ratings are given in gallons per minute continuous flow of water heated from 40°F to 140°F with 200°F boiler water.
2. For tankless heater quantities less than maximum allowable, it is important that water heaters be centrally located in the boiler.
   See Figure 8 for appropriate locations.
3. Tankless heater pressure drop is 5.5 PSI at **7.5 GPM.**



BOILER MODEL	DESTRATIFICATION PUMP REQUIREMENTS (GPM)
V903A	5.2
V904A	7.2
V905A	9.7
V906A	12.1
V907A	14.3
V908A	16.6
V909A	20.1
V910A	22.8
V911A	25.6
V912A	28.4

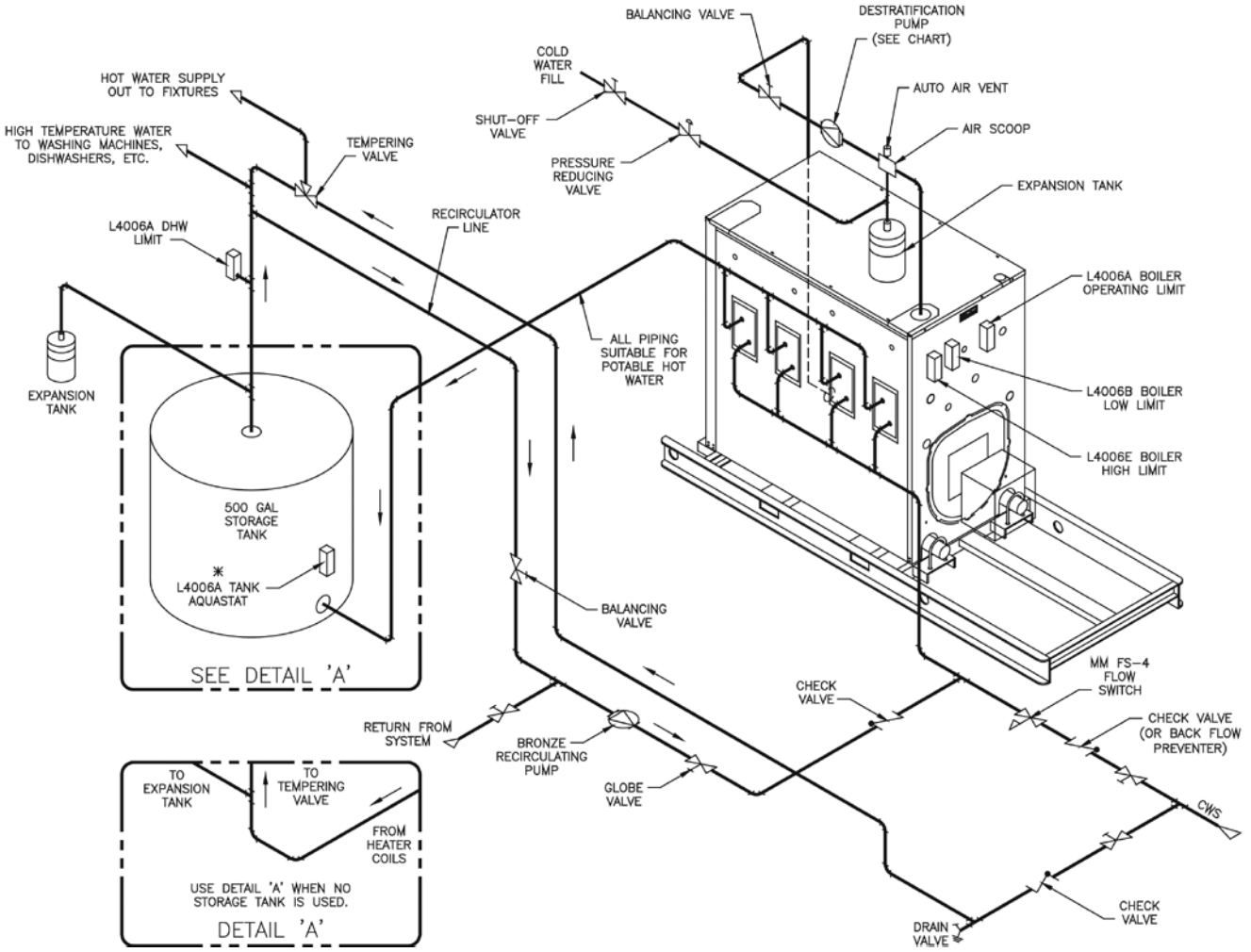


Figure 37b: DHW Generation with Tankless Coils, Storage Tank and Destratification Pump

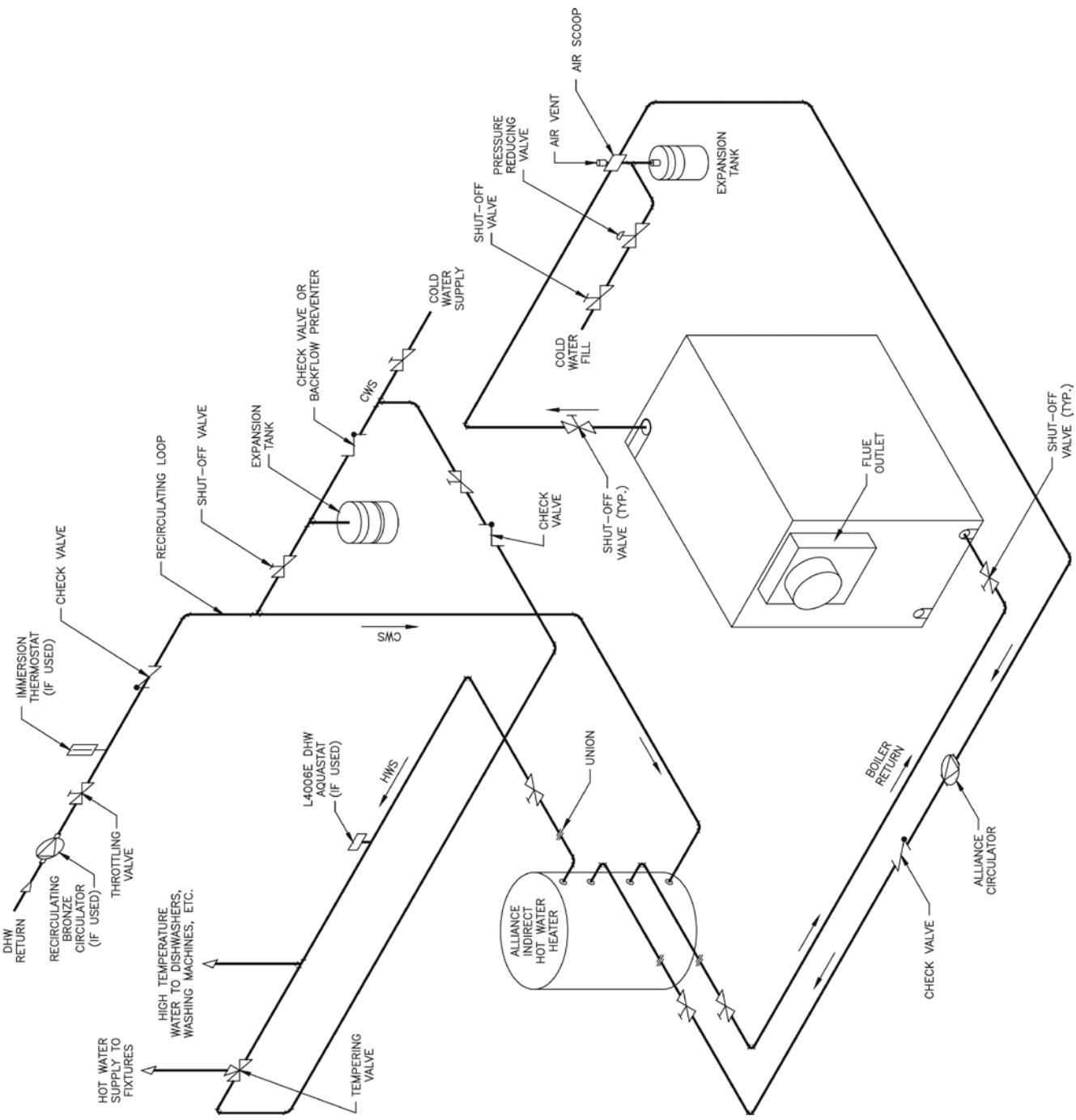


Figure 37c: DHW Generation with Indirect Water Heater

O. ELECTRIC WIRING - Install all field wiring in accordance with the National Electric Code and Local Regulations.

Control voltage and/or 3-phase line voltage must be supplied to the burner panel box through a fused disconnect.

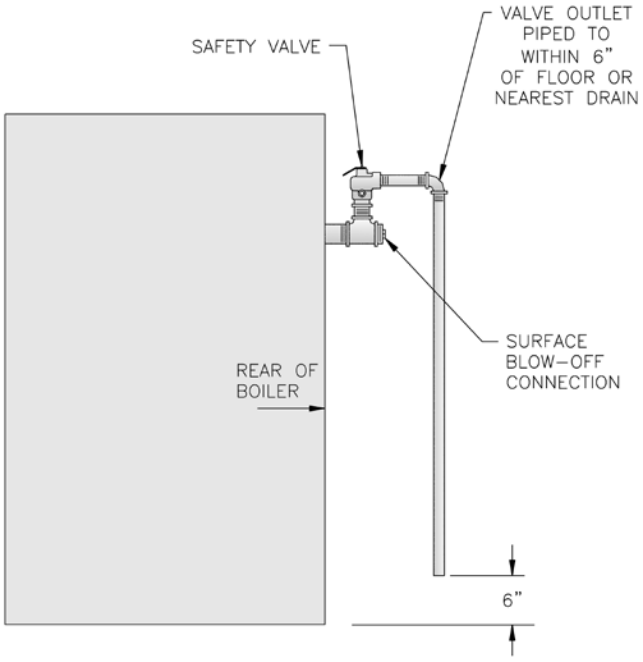


Figure 38a: Steam Boiler - Safety Valve Hook-up

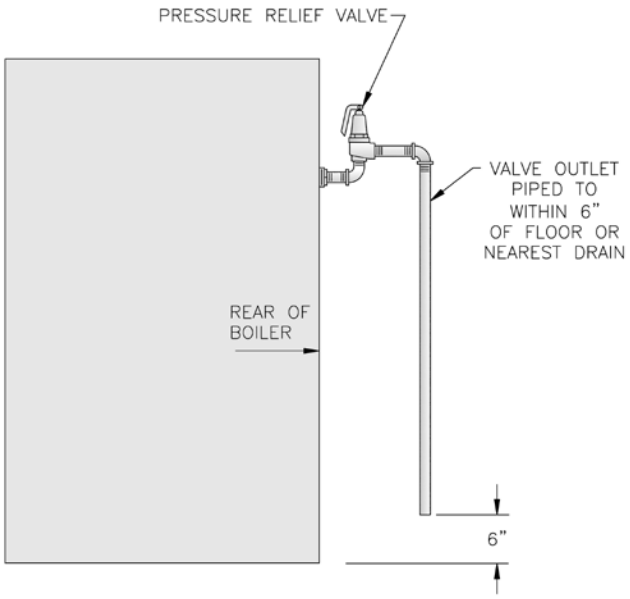


Figure 38b: Water Boiler - Pressure Relief Valve Hook-Up

SECTION IV - OPERATING INSTRUCTIONS

⚠WARNING

If you do not follow these instructions exactly, a fire or explosion may result causing property damage or personal injury.

If any unusual or improper operation or site conditions are observed, turn the boiler off and contact an experienced and skilled service agency.

Follow component manufacturer's instructions. Component manufacturer's instructions were provided with the boiler. Contact component manufacturer for replacement if instructions are missing. Do not install, start up, operate, maintain or service this boiler without reading and understanding all of the component instructions. Do not allow the boiler to operate with altered, disconnected or jumpered components. Only use replacement components identical to those originally supplied with the boiler and burner.

A. ALWAYS INSPECT INSTALLATION BEFORE STARTING BURNER.

B. FILL HEATING SYSTEM WITH WATER.

Boiler must be cleaned and fully free of oil and dirt.

NOTICE

Failure to clean the system will result in erratic water lines and surging, and other improper system operations.

CLEAN HEATING SYSTEM IF boiler water or condensate return water is dirty or if erratic water lines or surging exist after a few days of boiler operation. Refer to Paragraph (F) for proper cleaning instructions for steam and water boilers.

1. STEAM BOILERS - Fill boiler to normal water line. As shown in Figure 1, the normal water line is 41½" from the floor or bottom of casting. At the start of each heating season and once or twice during the season try SAFETY VALVE to be sure it is in working condition. To do this, fasten wire or cord to lever of valve and pull lever — standing safe distance away from valve.
2. HOT WATER BOILERS - Fill entire Heating System with water and vent air from system. Use the following procedure on a Series Loop or Multi-zoned System to remove air from system when filling:
   a. Close isolation valve in boiler supply piping.
   b. Isolate all circuits by closing zone valves or balancing valves.
   c. Attach a hose to bib cock located just below isolation valve in boiler supply piping.
      (Note - Terminate hose in five gallon bucket at a suitable floor drain or outdoor area).
   d. Starting with one circuit, open zone valve.
   e. Open bib cock.
   f. Open fill valve (Make-up water line should be located directly above isolation valve in boiler supply piping).
   g. Allow water to overflow from bucket until discharge from hose is bubble free for 30 seconds.
   h. Open zone valve to the second zone to be purged, then close the first. Repeat this step until all zones have been purged, but always have one zone open. At completion, open all zone valves.
   i. Close bib cock, continue filling the system until the pressure gauge registers normal system design operating pressure. Close fill valve. (Note - If make-up water line is equipped with pressure reducing valve, system will automatically fill to normal system design operating pressure. Leave globe valve open).
   j. Open isolation valve in boiler supply piping.
   k. Remove hose from bib cock.

⚠DANGER

Do not operate boiler with pressure above maximum allowable working pressure listed on the Boiler Rating Label.

DO NOT draw water from boiler while in use. When adding water while boiler is in operation, do not open supply valve fully but add water slowly.

C. SET CONTROLS with burner service switch turned "OFF".

1. PRESS RESET BUTTON on primary control and release.
2. On STEAM BOILERS set cut-in pressure on L404A Pressuretrol for three (3) PSI and differential pressure for two (2) PSI. These pressures may be varied to suit individual requirements of installation.
3. On STEAM BOILERS WITH TANKLESS DOMESTIC WATER HEATERS, set boiler water temperature dial on low limit operating control at 190°F (max.). Set differential at 10°.

4. ON WATER BOILERS WITHOUT TANKLESS HEATERS, set high limit dial on L4006A at 210°F. This temperature may be varied to suit requirements of installation.
5. ON WATER BOILERS WITH TANKLESS HEATERS, set low limit operating control dial at 190°F and high limit dial 210°F. Operating control must be a minimum of 20° below high limit setting. Set differential at 25°.

D. ADJUST BURNER according to the Burner Manual.

1. FLAME FAILURE

   The V9A boiler controls operate the burner automatically. If for unknown reasons the burner ceases to fire and the reset button on the primary control is tripped, the burner has experienced ignition failure. Before pressing the reset button, call your serviceman immediately.

⚠WARNING

Do not attempt to start the burner when excess oil or gas has accumulated in the combustion chamber, when the unit is full of vapor, or when the combustion chamber is very hot.

E. TEST CONTROLS

⚠WARNING

Before installation of the boiler is considered complete, the operation of the boiler controls should be checked, particularly the low water cutoff and the high limit control.

All controls must be checked prior to putting the boiler in service.

1. CHECK OPERATING CONTROL OPERATION.

   Raise and lower operating control setting as required to start and stop burner.
2. CHECK OPERATION OF HIGH LIMIT CONTROL —

   Jumper Operating Control Terminals. Allow burner to operate until shutdown by limit. Installation is not considered complete until this check has been made. REMOVE JUMPER.
3. CHECK LOW WATER CUTOFF control with water level at normal water line (see Figure 1). Raise operating control setting to allow burner to operate. Open boiler drain to allow water level to drop to bottom of sight glass until burner operation is shut down by low water cutoff.

   Close boiler drain and refill to normal water line. Burner should automatically restart during fill. RESET OPERATING CONTROL.

⚠CAUTION

Probe and float type low water cutoff devices require annual inspection and maintenance.

4. CHECK OPERATING CONTROL on boiler equipped with tankless heaters. With burner off, draw hot water until burner starts, then turn off hot water and check burner shutdown.

F. BOILER AND SYSTEM CLEANING - STEAM BOILER

NOTICE

A qualified water treatment chemical specialist should be consulted for recommendations regarding appropriate chemical compounds and concentrations which are compatible with local environmental regulations.

⚠WARNING

Chemicals used in treating boiler water are toxic and/or harmful. Always use protective clothing and equipment when working with/ near chemicals. Contact local authorities to determine if treated boiler water can be discharged into local waste water system.

1. Oil, greases & sediments which accumulate in a new boiler and piping must be removed in order to prevent an unsteady water line and carry over of the water into the supply main above boiler. Operate the boiler with steam in the entire system for a few days allowing the condensate to return to the boiler. If the condensate can temporarily be wasted, operate boiler only for the length of time it takes for condensate to run clear. If the latter cannot be achieved or if the condensate is returned to the boiler, boil out the boiler using the SURFACE BLOWOFF connection. See Figure 38a.
   a. Drain boiler until water is just visible in gauge glass. Run temporarily 1½" pipe line from the surface blowoff connection to an open drain or some other location where hot water may be discharged safely. Do not install valve in this line.
   b. Add an appropriate amount of recommended boilout compounds.
   c. Start burner and operate sufficiently to boil the water without producing steam pressure. Boil for about 5 hours. Open boiler feed pipe sufficiently to permit a steady trickle of water from the surface blowoff pipe. Continue this slow boiling and trickle of overflow for several hours until the water coming from the overflow is clear.

d. Stop burner and drain boiler in a manner and to a location that hot water can be discharged with safety.

e. Refill boiler to normal water line. If water in gauge glass does not appear to be clear, repeat steps (a. thru e.), and boil out the boiler for a longer time.

2. Low pressure steam boilers such as the V9A Series should be maintained with appropriate water treatment compounds. After cleaning process has been completed, add water treatment compounds as recommended by your local qualified water treatment company.

3. Remove temporary surface blowoff piping and replug tapping. Boil or bring water temperature to 180°F promptly in order to drive off the dissolved gases in the fresh water.

4. If unsteady water line, foaming or priming persist, install gate valve in Hartford Loop and drain valves in return main and at boiler and proceed as follows:

   a. Connect hoses from drain cocks to floor drain. Close gate valve in Hartford Loop and open drain valve in return main. Fill boiler to normal water level, turn on burner and operate boiler at this water level for at least 30 minutes after the condensate begins to run hot, then turn off burner.

      Close all radiator valves. Remove all supply main air valves and plug the openings in supply main.

   b. Draw about 5 gallons of hot water from boiler into a container and dissolve into it appropriate amount of a recommended boilout compound. Remove surface blowoff plug and pour this solution into boiler, then reinstall plug.

   c. Turn on burner and keep operating while feeding water to boiler slowly. This will raise water level in boiler slowly so that water will be boiling hot and will rise slowly into supply main and back through return main, flowing from drain hose at about 180°F. Continue until water runs clear from drain hose for at least 30 minutes.

   d. Stop feeding water to boiler but continue operating burner until excess water in boiler flows out through supply main and water lowers (by steaming) until it reaches normal level in boiler. Turn off burner. Drain boiler. Open all radiator valves. Reinstall all supply main air valves. Open gate valve in Hartford Loop.

   e. When boiler has cooled down sufficiently (crown sheet of sections are not too hot to touch), close the drain cocks at boiler and in return main and feed water slowly up to normal level in boiler. Turn on burner and allow boiler to steam for 10 minutes then turn off burner. Draw off one quart of water from bottom gauge glass fitting and discard. Draw off another quart sample and if this sample is not clear, repeat the cycle of draining the boiler and return main and refilling the boiler until sample is clear.

   f. If the boiler water becomes dirty again at a later date due to additional sediment loosened up in the piping, close gate valve in Hartford Loop, open drain valve in return main, turn on burner and allow condensate to flow to drain until it has run clear for at least 30 minutes while feeding water to boiler so as to maintain normal water level. Turn off burner, drain boiler, open gate valve in Hartford Loop, then repeat step (1) above.

5. Make pH or Alkalinity Test.

   After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done by drawing a small sample of boiler water and testing hydrion paper which is used in the same manner as litmus paper, except it gives specific readings. A color chart on the side of the small hydrion dispenser gives the reading in pH. Hydrion paper is inexpensive and obtainable from any chemical supply house or through your local druggist. The pH should be higher than 7, but lower than 11. Add some appropriate water treatment chemicals, if necessary to bring the pH within the specified range.

6. Boiler is now ready to be put into service.

G. BOILER AND SYSTEM CLEANING - WATER BOILERS

1. Filling of Boiler and System --- General --- In a hot water heating system, the boiler and entire system (other than the expansion tank) must be full of water for satisfactory operation. Water should be added to the system until the boiler pressure gauge registers normal system design operating pressure. To insure that the system is full, water should come out of all air vents when opened.

2. Boiling Out of Boiler and System. The oil and grease which accumulate in a new hot water boiler can be washed out in the following manner.

   a. Remove safety relief valve using extreme care to avoid damaging it.

   b. Add an appropriate amount of recommended boilout compound.

   c. Reinstall safety relief valve.

   d. Fill the entire system with water.

   e. Start firing the boiler.

   f. Circulate the water through the entire system.

   g. Vent the system, including the radiation.

   h. Allow boiler water to reach operating temperature, if possible.

   i. Continue to circulate the water for a few hours.

   j. Stop firing the boiler.

k. Drain the system in a manner and to a location that hot water can be discharged with safety.

l. Remove plugs from all available returns and wash the water side of the boiler as thoroughly as possible, using a high-pressure water stream.

m. Refill the system with fresh water.

3. Add appropriate boiler water treatment compounds as recommended by your local qualified water treatment company.

4. Make pH or Alkalinity Test.

   After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done by drawing a small sample of boiler water and testing with hydrion paper which is used in the same manner as litmus paper, except it gives specific readings. A color chart on the side of the small hydrion dispenser gives the reading in pH. Hydrion paper is inexpensive and obtainable from any chemical supply house or thru your local druggist. The pH should be higher than 7 but lower than 11. Add some appropriate water treatment chemicals, if necessary to bring the pH within the specified range. With this lower level of protection, care must be exercised to eliminate all of the free oxygen in the system.

5. Boiler is now ready to be put into service.

NOTICE

IF, DURING NORMAL OPERATION, IT IS NECESSARY TO ADD MORE WATER PER MONTH THAN INDICATED BELOW, CONSULT A QUALIFIED SERVICE TECHNICIAN TO CHECK YOUR SYSTEM FOR LEAKS.

EXCESSIVE WATER ADDITION: (Gal/Month)			
V903A	16½	V908A	44
V904A	22	V909A	49½
V905A	27½	V910A	55
V906A	33	V911A	60½
V907A	38½	V912A	66

H. FREQUENT WATER ADDITION

A leaky system will increase the volume of make-up water supplied to the boiler which can significantly shorten the life of the boiler. Entrained in make-up water are dissolved minerals and oxygen. When the fresh, cool make-up water is heated in the boiler the minerals fall out as sediment and the oxygen escapes as a gas. Both can result in reduced boiler life. The accumulation of sediment can eventually isolate the water from contacting the cast iron. When this happens the cast iron in that area gets extremely hot and eventually cracks. The presence of free oxygen in the boiler creates a corrosive atmosphere which, if the concentration becomes high enough, can corrode the cast iron through from the inside. Since neither of these failure types are the result of a casting defect, the warranty does not apply. The maintenance of system integrity is the best method to prevent these types of failure.

I. OXYGEN CORROSION:

⚠WARNING

Oxygen contamination of the boiler water will cause corrosion of iron and steel boiler components, and can lead to boiler failure. Burnham's standard warranty does not cover problems caused by oxygen contamination of boiler water or scale (lime) build-up caused by frequent addition of water.

There are many possible causes of oxygen contamination such as:

a. Addition of excessive make-up water as a result of system leaks.

b. Absorption through open tanks and fittings.

c. Oxygen permeable materials in the distribution system.

In order to insure long product life, oxygen sources must be eliminated. This can be accomplished by taking the following measures:

a. Repairing system leaks to eliminate the need for addition of make-up water.

b. Eliminating open tanks from the system.

c. Eliminating and/or repairing fittings which allow oxygen absorption.

d. Use of non-permeable materials in the distribution system.

e. Consult your local water treatment specialist for specific recommendations.

Recommended Water Quality Requirements

pH - 8.3 - 10.5

TDS - 3500 ppm (Max)

Total alkalinity ppm as $CaCO_3$ - 1200 (Max)

Total copper ppm - .05

Oily matter ppm -1

total harness ppm -3

chlorides - < 50 ppm

SECTION V - SERVICE INSTRUCTIONS

⚠DANGER

This boiler uses flammable gas, high voltage electricity, moving parts, and very hot water under high pressure. Assure that all gas and electric power supplies are off and that the water temperature is cool before attempting any disassembly or service.
More than one gas shut-off valve and electrical disconnect switch are used on the boiler. Assure that all gas valves and electrical disconnect switches are off before attempting any disassembly or service.

Do not attempt any service work if gas is present in the air in the vicinity of the boiler. Never modify, remove or tamper with any control device.

⚠WARNING

This boiler must only be serviced and repaired by skilled and experienced service technicians.

If any controls are replaced, they must be replaced with identical models.

Read, understand and follow all the instructions and warnings contained in all the sections of this manual.

If any electrical wires are disconnected during service, clearly label the wires and assure that the wires are reconnected properly.

NEVER operate boiler without all sight glasses and brackets in place and securely fastened and sealed. Very HOT combustion gas may cause burn injury.

Read, understand and follow all the instructions and warnings contained in ALL of the component instruction manuals.

Assure that all safety and operating controls and components are operating properly before placing the boiler back in service.

A. GENERAL — Inspection should be conducted annually. Service as frequently as specified in paragraphs below. While service or maintenance is being done, electrical power to the boiler must be "off".

B. CLEAN THE BOILER HEATING SURFACES & FLUE at least once each year, preferably at the end of the heating season.

1. CLEAN THE VENT SYSTEM — Vent system should be checked annually for:
   a. Obstructions.
   b. Accumulations of soot.
   c. Deterioration of vent pipe or vent accessories due to condensation or other reasons.
   d. Proper support — no sags, particularly in horizontal runs.
   e. Tightness of joints.
   f. Remove the smoke pipe. Remove all accumulations of soot with wire brush and vacuum. Remove all obstructions. Replace all deteriorated parts and support properly. Seal all joints.
2. CLEAN THE BOILER FLUEWAYS
   a. Remove the jacket left side panels.
   b. Loosen nuts securing the flue cleanout plates and remove the plates. The insulation should be removed with the plates taking care not to damage the insulation.
   c. Using a 1¼" diameter wire or fibre bristle brush (36" handle) clean the flueways. Start at the top of each flueway opening and work down the pin rows using two or three horizontal strokes per row for best results.
3. CLEAN TOP OF BOILER SECTIONS

   Remove the jacket top panel. Remove the top flue canopy cover or outlet assembly. Use a flashlight to inspect the upper portion of the flueways and top of castings for soot and debris. Heavy accumulations over 1/16" thick must be removed. Remove the canopy being careful not to damage the cerafelt strips. Brush and vacuum the upper flueways and tops of castings.
4. CLEAN THE FIREBOX
   a. Disconnect fuel line(s) and remove burner and burner mounting plate.
   b. Using wire or fibre bristle brush clean crown of boiler and inside of water legs.
   c. Inspect target wall (V903A only) for damage or deterioration. If target wall is damaged, replace.

5. REASSEMBLE BOILER

⚠ CAUTION

Do not start the burner unless canopy, smokepipe, burner mounting plate and all flue plates are secured in place.

a. If removed, install the canopy taking care to align the cerafelt strips. If strips are damaged replace as needed.
b. Reinstall burner mounting plate to front section making sure 3/16" diameter rope gasket is in place and forms gas tight seal. If gasket is damaged, replace.
c. Bolt burner to burner mounting plate. Inspect gasket to assure adequate seal. Replace if damaged. Connect oil line(s) and/or gas line(s).
d. Reinstall flue plates making sure gasket on each plate is in place and forms gas tight seal. If damaged, all edges of the cleanout plates should be sealed with Silastic sealant when reinstalled until insulation can be replaced.
e. If removed, reinstall jacket top.
f. Reinstall left side panels.
g. Reinstall smokepipe.

C. MAINTENANCE OF LOW WATER CUTOFF DEVICES.

NOTICE

Probe and float type low water cutoff devices require annual inspection and maintenance.

1. PROBE TYPE LOW WATER CUTOFF

Although these devices are solid state in their operation, the probe is exposed to possible contamination in the boiler water and subject to fouling.

It is important to physically remove the probe from the boiler tapping annually and inspect that probe for accumulation of scale or sediment.

Follow these steps to inspect, clean and/or replace the probe:

a. Turn off electric service to the boiler.
b. Drain boiler water to a level below the tapping for the probe.

⚠ DANGER

Assure that the boiler is at zero pressure before removing the LWCO probe. Do not rely on the pressure gauge to indicate that the boiler is at zero pressure. Open the safety valve to relieve all internal pressure prior to proceeding. Safety valve discharge piping must be piped such that the potential for burns is eliminated.

c. Disconnect wiring connections between the low water cutoff control and the probe.
d. Dismount the low water cutoff control from the probe.
e. Unscrew the probe from the boiler tapping.
f. Inspect that portion of the probe that is exposed to the boiler water for a scale or sediment buildup.
g. Light deposits may be removed by wiping the probe with a damp cloth. Wiping the probe with a cloth soaked in vinegar will remove more tenacious lime deposits. The most stubborn deposits may be removed from the probe by using a diluted amount (three 3 parts of water to one (1) part) of phosphoric acid (H2PO4).

⚠ WARNING

Exercise caution when handling phosphoric acid and follow the instructions on container label. Always use protective clothing and equipment when working with/near chemicals.

h. Wire brushing of the probe is not recommended as the soft platinum guard ring sandwiched between the ceramic insulators may be damaged. Care must be taken not to damage this ring in any way or the useful life of the probe may be shortened.
i. Clean the pipe threads of the probe to remove old, hardened pipe dope and other foreign matter.
j. Apply a moderate amount of good quality pipe dope to the pipe threads on the probe. Leaving the two end threads bare. Do not use PTFE (Teflon) tape.
k. Screw the probe into the boiler tapping.
l. Mount the low water cutoff control on the probe.
m. Reconnect the control to probe wiring.
n. Fill the boiler to its normal waterline.
o. Add boiler water treatment compound as needed.
p. Restore electric service to the boiler.
q. Fire burner to bring the water in the boiler to a boil to drive off free oxygen.
r. BEFORE RETURNING BOILER TO SERVICE Follow the low water cutoff checkout procedure in Section IV, Paragraph E, Step 3.

2. FLOAT TYPE LOW WATER CUTOFF

During the heating season, if an external low water cutoff is on the boiler, the blow off valve should be opened once a month (use greater frequency where conditions warrant), to flush out the sediment chamber so the device will be free to function properly.

Low water cutoffs and water feeders should be dismantled annually by qualified personnel, to the extent necessary to insure freedom from obstructions

and proper functioning of the working parts. Inspect connecting lines to boiler for accumulation of mud, scale, etc., and clean as required. Examine all visible wiring for brittle or worn insulation and make sure electrical contacts are clean and that they function properly. Give special attention to solder joints on bellows and float when this type of control is used. Check float for evidence of collapse and check mercury bulb (where applicable) for mercury separation or discoloration. DO NOT ATTEMPT TO REPAIR MECHANISMS IN THE FIELD. Complete replacement mechanisms, including necessary gaskets and installation instructions, are available from the manufacturer.

D. CHECK BURNER AND CONTROLS at least once a year. See Section IV - Operating Instructions, Paragraph E for control checks. See Burner Manual for burner tests and adjustments.

E. LUBRICATE BOILER COMPONENTS according to manufacturer's instructions. Generally, this involves the oil burner and circulator. This includes the type of lubricant to use, frequency of lubrication, and points to lubricate.

F. GENERAL MAINTENANCE CONSIDERATIONS

1. Keep radiators and convectors clean.
2. If a hot water radiator is hot at the bottom but not at the top, it indicates that air has accumulated inside and should be vented. To vent radiator, hold small cup under air vent (located near top of radiator), open vent until water escapes and then close.
3. If much water is added to system, it is advisable to heat system to a high temperature and vent again. This will make less venting necessary during the winter.
4. Where an expansion tank is used, make sure that neither the tank nor its drain pipe is exposed to freezing temperatures. Never place valves in piping leading to or from expansion tank.
5. Boiler and system cleaning will help assure trouble free operation. See Section IV - Operating Instructions, Paragraphs F or G for procedure.

G. ATTENTION TO BOILER WHILE NOT IN OPERATION

⚠WARNING

If boiler is not used during winter time, it must be fully drained to prevent freeze damage.

1. Spray inside surfaces with light lubricating or crankcase oil using gun with extended stem so as to reach all corners.
2. With steam boilers, at end of season add sufficient water to fill boiler to top of water column and leave it that way until fall when water should be drained again to proper level. If at this time boiler water is dirty, drain water, flush out boiler, and refill with clean water to prescribed water level.
3. Always keep the manual fuel supply valve shut off when the burner is shut down for an extended period of time.
4. To recondition the heating system in the fall season after a prolonged shut down, follow the instructions outlined in Section IV - Operating Instructions, Paragraphs B through G.

SECTION VI - BURNER SPECIFICATIONS

NOTICE

V9A boiler ratings and capacities are based upon the following burners, pump pressures, nozzle sizes and manifold pressures. Refer to instructions furnished with burner for additional information regarding proper installation, fuel piping, wiring details, burner adjustments, service instructions and burner start-up.

Table V: Beckett Burner Specifications

OIL BURNERS

Boiler Model	Burner Input (GPH)	Burner Mfr.	Burner Model	Air Tube Comb.	Burner Settings					Pump Pressure (PSI)		Nozzle Make	Nozzle Data
					Head	Air Shutter	Air Band	Air Damper		Low Fire	High Fire		GPH x Angle-Type
								Low	High				
V903A	3.1	Beckett	CF-500	CF60KK	2	10	3	N/A	N/A	---	150	Hago	2.50 x 45° - P
V904A	4.2	Beckett	CF-800	CF80KH	1	8	0	N/A	N/A	---	150	Hago	3.40 x 45° - P
V905A	5.6	Beckett	CF-800	CF80KH	2	10	6	N/A	N/A	---	150	Hago	4.50 x 45° - P
V906A	7.0	Beckett	CF-1400	CF66KD	3	N/A	N/A	2.75	4.0	150	300	Hago	4.00 x 60° - P
V907A	8.3	Beckett	CF-1400	CF66KD	4	N/A	N/A	3.0	6.5	150	275	Hago	5.00 x 45° - P
V908A	9.6	Beckett	CF-1400	CF66KEE	1	N/A	N/A	3.5	8.5	150	300	Hago	5.50 x 45° - P
V909A	11.6	Beckett	CF-2300A	CF66KG	0	N/A	N/A	2.0	4.0	150	275	Hago	7.00 x 45° - P
V910A	13.2	Beckett	CF-2300A	CF66KG	1	N/A	N/A	2.0	6.0	150	275	Hago	8.00 x 45° - P
V911A	14.8	Beckett	CF-2500	CF66KP	0	N/A	N/A	0.5	3.0	275	275	Hago	(L) 4.50 x 45° - P
V912A	16.4	Beckett	CF-2500	CF66KP	0	N/A	N/A	0.5	4.0	275	275	Hago	(H) 5.00 x 45° - P

GAS BURNERS

Boiler Model	Burner Input (MBH)	Burner Mfr.	Burner Model	Damper Settings				Manifold Pressure - "W.C.		Minimum Inlet Pressure - "W.C.
				Low Fire	High Fire	Shutter	Band	Low Fire (Start)	High Fire	
V903A	447	Beckett	CG10.1S	---	---	10	1	(1.3)	2.5	3.24
V904A	606	Beckett	CG10.4S	---	---	5	2	(1.3)	2.6	3.64
V905A	808	Beckett	CG10.5S	---	---	7	1	(1)	3.3	4.61
V906A	1010	Beckett	CG10.6S	---	---	10	6	(1.1)	3.64	5.43
V907A	1198	Beckett	CG15.3S	18	43	---	---	0.9	3.1	5.31
V908A	1386	Beckett	CG15.4S	21	63	---	---	0.95	3.3	6.14
V909A	1674	Beckett	CG25.2S	23	47	---	---	0.8	3.43	4.69
V910A	1905	Beckett	CG25.3S	26	52	---	---	0.8	3.44	4.94
V911A	2136	Beckett	CG25.4S	28	58	---	---	0.8	3.0	4.88
V912A	2367	Beckett	CG50.2S	10	25	---	---	0.8	2.1	3.87

Table VI: Power Flame Burner Specifications

OIL BURNERS

Boiler Model	Burner Input (GPH)	Burner Mfr.	Burner Model	Diffuser Blade Setting	Damper Settings Top / Bottom Damper		Pump Pressure (PSI)		Nozzle Make	Nozzle Data GPH x Angle-Type
					Low Fire	High Fire	Low Fire	High Fire		
V904A	4.2	Power Flame	C1-OS	1/8	1/4" / Closed	3/4" / 1/4"	100	270	Delavan	2.50 x 90° - B
V905A	5.6	Power Flame	C1-OS	1/4	Closed / 1/2"	3/8" / 7/8"	100	295	Delavan	3.25 x 80° - B
V906A	7.0	Power Flame	C1-OS	1/4	3/8" / 3/16"	7/8" / 9/16"	100	300	Delavan	4.00 x 80° - B
V907A	8.3	Power Flame	C1-OS	1/2	1/2" / Closed	11/16" / 3/16"	100	275	Delavan	5.00 x 70° - B
V908A	9.6	Power Flame	C2-OAS	1/8	1/2" / Closed	1/2" / 1"	100	260	Delavan	6.00 x 80° - B
V909A	11.6	Power Flame	C2-OAS	1/4	3/8" / 1/16"	3/4" / 5/16"	100	275	Delavan	7.00 x 80° - B
V910A	13.2	Power Flame	C2-OAS	1/4	3/8" / 1/4"	7/8" / 1/2"	100	275	Delavan	8.00 x 80° - B
V911A	14.8	Power Flame	C2-OB	1/4	1/2" / 1/4"	1-1/8" / 5/8"	100	270	Delavan	9.00 x 80° - B
V912A	16.4	Power Flame	C2-OB	1/4	3/4" / 1/4"	1-1/4" / 3/4"	100	270	Delavan	10.00 x 80° - B

GAS BURNERS

Boiler Model	Burner Input (GPH)	Burner Mfr.	Burner Model	Diffuser No. (or Blade Setting)	Damper Settings Top / Bottom Damper		Manifold Pressure "W.C.		** Minimum Inlet Pressure "W.C.	
					Low Fire	High Fire	Nat. Gas	LP Gas (1)	Nat. Gas	LP Gas (1)
V903A	447	Power Flame	JR15A-10	J20611	1/8" / 1/8"	3/8" / 3/8"	3.5	3.5	4	4
V904A	606	Power Flame	JR30A-10	J20610	1/8" / 1/8"	5/8" / 5/8"	3.4	3.4	4.2	4.2
V904A	606	Power Flame	C1-G-10	1/8"	1/4" / Closed	3/4" / 1/4"	3.6	3.6	4.4	4.4
V905A	808	Power Flame	JR30A-12	J20615	1/16" / 1/16"	7/16" / 7/16"	3.4	3.4	4.1	4.1
V905A	808	Power Flame	C1-G-10	1/4"	Closed / 1/2"	3/8" / 7/8"	3.0	3.0	4.4	4.4
V906A	1010	Power Flame	JR30A-12	J20615	1/16" / 7/8"	13/16" / 7/8"	2.1	2.1	4.3	4.3
V906A	1010	Power Flame	C1-G-12	1/4"	3/8" / 3/16"	7/8" / 9/16"	2.6	2.6	4.8	4.8
V907A	1198	Power Flame	JR50A-15	J20607	1/4" / 1/4"	1" / 1"	2.3	2.3	5.4	5.4
V907A	1198	Power Flame	C1-G-12	1/2	1/2" / Closed	11/16" / 3/16"	2.1	2.1	5.2	5.2
V908A	1386	Power Flame	JR50A-15	J20607	Closed / Closed	1-1/4" / 1-1/4"	2.7	2.7	4.4	4.4
V908A	1386	Power Flame	C2-G-15	1/8"	1/2" / Closed	1/2" / 1.0"	2.1	2.1	6.4	6.4
V909A	1674	Power Flame	JR50A-15	J20599	5/16" / 1/8"	3/4" / 7/8"	2.4	2.4	5	5
V909A	1674	Power Flame	C2-G-20A	1/4"	3/8" / 1/16"	3/4" / 5/16"	2.3	2.3	4.9	4.9
V910A	1905	Power Flame	C2-G-20A	1/4'	3/8" / 1/4"	7/8" / 1/2"	1.8	1.8	5.2	5.2
V911A	2136	Power Flame	C2-G-20B	1/4"	1/2" / 1/4"	1-1/8" / 5/8"	2	2	5.4	5.4
V912A	2367	Power Flame	C2-G-20B	1/4"	3/4" / 1/4"	1-1/4" / 3/4"	3.4	3.4	5	5

* COMBINATION GAS / OIL BURNERS

Boiler Model	Burner Input		Burner Mfr.	Burner Model	Diffuser Blade Setting	Damper Settings Top / Bottom Damper		Manifold Pressure "W.C.		** Minimum Inlet Pressure - "W.C.	
	Oil (GPH)	Gas (MBH)				Low Fire	High Fire	Low Fire	High Fire	Nat. Gas	LP Gas (1)
V904A	4.2	606	Power Flame	C1-GO-10	1/8	1/4" / Closed	3/4" / 1/4"	3.6	3.6	4.4	4.4
V905A	5.6	808	Power Flame	C1-GO-10	1/4	Closed / 1/2"	3/8" / 7/8"	3.0	3.0	4.4	4.4
V906A	7.0	1010	Power Flame	C1-GO-12	1/4	3/8" / 3/16"	7/8" / 9/16"	2.6	2.6	4.8	4.8
V907A	8.3	1198	Power Flame	C1-GO-12	1/2	1/2" / Closed	11/16" / 3/16"	2.1	2.1	5.2	5.2
V908A	9.6	1386	Power Flame	C2-GO-15	1/8	1/2" / Closed	1/2" / 1"	2.1	2.1	6.4	6.4
V909A	11.6	1674	Power Flame	C2-GO-20A	1/4	3/8" / 1/16"	3/4" / 5/16"	2.3	2.3	4.9	4.9
V910A	13.2	1905	Power Flame	C2-GO-20A	1/4	3/8" / 1/4"	7/8" / 1/2"	1.8	1.8	5.2	5.2
V911A	14.8	2136	Power Flame	C2-GO-20B	1/4	1/2" / 1/4"	1-1/8" / 5/8"	2.0	2.0	5.4	5.4
V912A	16.4	2367	Power Flame	C2-GO-20B	1/4	3/4" / 1/4"	1-1/4" / 3/4"	3.4	3.4	5.0	5.0

*** SEE OIL BURNER DATA ABOVE FOR NOZZLE SIZES AND PUMP PRESSURE SETTINGS.**
**** MINIMUM INLET PRESSURE FOR UL GAS TRAINS ONLY. CONSULT FACTORY FOR ADDITIONAL INFORMATION.**

NOTES: (1) Burner not approved in Canada for LP gas.

Table VII: Webster Burner Specifications

OIL BURNERS

Boiler Model	Burner Input (GPH)	Burner Mfr.	Burner Model	Burner Settings			Air Inlet Settings		Pump Pressure (PSI)		Nozzle Make	Nozzle Data
				Nozzle to Diffuser	Drawer Assembly	Inner Fire Cylinder	Low Fire	High Fire	Low Fire	High Fire		GPH x Angle-Type
V903A	3.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
V904A	4.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
V905A	5.6	Webster	JB1-02	1/16”	(1)	1/4”	1/16”	(2)	100	256	Delavan	(2) 1.75 x 80° -B
V906A	7.0	Webster	JB1-03	1/4”	(1)	3/8”	1/16”	(2)	100	242	Delavan	(2) 2.25 x 80° - B
V907A	8.3	Webster	JB1-03	1/4”	(1)	3/8”	1/16”	(2)	100	276	Delavan	(2) 2.50 x 80° - B
V908A	9.6	Webster	JB1-03	1/8”	(1)	1/4”	1/16”	(2)	100	300	Delavan	(2) 2.75 x 80° - B
V909A	11.6	Webster	JB1-05	1/8”	(1)	3/4”	1/16”	(2)	100	296	Delavan	(1) 3.50 x 80° - B (1) 3.20 X 80° - B
V910A	13.2	Webster	JB1-05	3/16”	(1)	1”	1/16”	(2)	100	273	Delavan	(2) 4.00 x 80° - B
V911A	14.8	Webster	JB1-07	3/16”	(1)	3/4”	1/16”	(2)	100	271	Delavan	(2) 4.50 x 80° - B
V912A	16.4	Webster	JB1-07	3/16”	(1)	3/4”	1/16”	(2)	100	298	Delavan	(1) 5.00 x 80° - B (1) 4.50 x 80° - B

NOTES: (1) Straight oil burner drawer assembly is #420007 with direct spark ignition, straight gas drawer assembly is #420005, and gas/oil drawer assembly is #420010 with proven gas pilot. For all oil and gas/oil drawer assemblies, you must also specify nozzles required.
(2) High fire damper setting will vary with final job site conditions.

GAS BURNERS

Boiler Model	Burner Input (GPH)	Burner Mfr.	Burner Model	Burner Settings			Air Inlet Settings		Manifold Pressure
				Nozzle to Diffuser	Drawer Assembly	Inner Fire Cylinder	Low Fire	High Fire	High Fire “W.C.
V903A	447	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
V904A	606	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
V905A	808	Webster	JB1-02	1/16”	(1)	1/4”	1/16”	(2)	1.8
V906A	1010	Webster	JB1-03	1/4”	(1)	3/8”	1/16”	(2)	2.3
V907A	1198	Webster	JB1-03	1/4”	(1)	3/8”	1/16”	(2)	2.8
V908A	1386	Webster	JB1-03	1/8”	(1)	1/4”	1/16”	(2)	2.6
V909A	1674	Webster	JB1-05	1/8”	(1)	3/4”	1/16”	(2)	3.2
V910A	1905	Webster	JB1-05	3/16”	(1)	1”	1/16”	(2)	4.1
V911A	2136	Webster	JB1-07	3/16”	(1)	3/4”	1/16”	(2)	4.8
V912A	2367	Webster	JB1-07	3/16”	(1)	3/4”	1/16”	(2)	4.2

NOTES: (1) Straight oil burner drawer assembly is #420007 with direct spark ignition, straight gas drawer assembly is #420005, and gas/oil drawer assembly is #420010 with proven gas pilot. For all oil and gas/oil drawer assemblies, you must also specify nozzles required.
(2) High fire damper setting will vary with final job site conditions.

COMBINATION GAS / OIL BURNERS

Boiler Model	Burner Input (GPH)		Burner Mfr.	Burner Model	Burner Settings			Air Inlet Settings		Manifold Pressure	Pump Pressure (PSI)		Nozzle Make	Nozzle Data
	Oil (GPH)	Gas (MBH)			Nozzle to Diffuser	Drawer Assembly	Inner Fire Cylinder	Low Fire	High Fire	High Fire “W.C.	Low Fire	High Fire		GPH x Angle-Type
V903A	3.1	447	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
V904A	4.2	606	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
V905A	5.6	808	Webster	JB1-02	1/16”	(1)	1/4”	1/16”	(2)	1.8	100	256	Delavan	(2) 1.75 x 80° -B
V906A	7.0	1010	Webster	JB1-03	1/4”	(1)	3/8”	1/16”	(2)	2.3	100	242	Delavan	(2) 2.25 x 80° - B
V907A	8.3	1198	Webster	JB1-03	1/4”	(1)	3/8”	1/16”	(2)	2.8	100	276	Delavan	(2) 2.50 x 80° - B
V908A	9.6	1366	Webster	JB1-03	1/8”	(1)	1/4”	1/16”	(2)	2.6	100	300	Delavan	(2) 2.75 x 80° - B
V909A	11.6	1674	Webster	JB1-05	1/8”	(1)	3/4”	1/16”	(2)	3.2	100	296	Delavan	(1) 3.50 x 80° - B (1) 3.20 X 80° - B
V910A	13.2	1905	Webster	JB1-05	3/16”	(1)	1”	1/16”	(2)	4.1	100	273	Delavan	(2) 4.00 x 80° - B
V911A	14.8	2136	Webster	JB1-07	3/16”	(1)	3/4”	1/16”	(2)	4.8	100	271	Delavan	(2) 4.50 x 80° - B
V912A	16.4	2367	Webster	JB1-07	3/16”	(1)	3/4”	1/16”	(2)	4.2	100	298	Delavan	(1) 5.00 x 80° - B (1) 4.50 x 80° - B

NOTES: (1) Straight oil burner drawer assembly is #420007 with direct spark ignition, straight gas drawer assembly is #420005, and gas/oil drawer assembly is #420010 with proven gas pilot. For all oil and gas/oil drawer assemblies, you must also specify nozzles required.
(2) High fire damper setting will vary with final job site conditions.

Table VIII: Carlin Burner Specifications

OIL BURNERS

Boiler Model	Burner Input (GPH)	Burner Mfr.	Burner Model	Air Tube Comb.	Burner Settings				Pump Pressure (PSI)		Nozzle Make	Nozzle Data
					Head	Air Band	Air Damper Low	Air Damper High	Low Fire	High Fire		
V903A	3.1	Carlin	301CRD	8" - Style 'B'	1/4"	60%	N/A	N/A	---	150	Delavan	2.50 x 80° - B
V904A	4.2	Carlin	301CRD	8" - Style 'B'	1/2"	100%	N/A	N/A	---	150	Hago	3.50 x 80° - SS
V905A	5.6	Carlin	301CRD	8" - Style 'C'	34"	100%	N/A	N/A	---	150	Hago	4.50 x 80° - SS
V906A	7.0	Carlin	702CRD	10" Std.	7/32"	N/A	1/2"	Open	100	300	Hago	4.00 x 60° - P
V907A	8.3	Carlin	702CRD	10" Std.	1/2"	N/A	1/2"	Open	100	300	Hago	5.00 x 60° - P
V908A	9.6	Carlin	702CRD	10" Std.	3/4"	N/A	1/2"	Open	100	300	Hago	5.50 x 60° - P
V909A	11.6	Carlin	801CRD	10" Std.	1/4"	N/A	1/4"	Open	150	150	Hago	(L) 5.50 x 45° - H (H) 4.00 x 45° - H
V910A	13.2	Carlin	801CRD	10" Std.	9/16"	N/A	1/4"	Open	150	150	Hago	(L) 6.50 x 45° - H (H) 4.50 x 45° - H
V911A	14.8	Carlin	801CRD	10" Std.	3/4"	N/A	1/2"	Open	150	150	Hago	(L) 6.00 x 45° - H (H) 6.00 x 45° - H
V912A	16.4	Carlin	801CRD	10" Std.	3/4"	N/A	1/2"	Open	150	150	Hago	(L) 7.00 x 45° - H (H) 6.50 x 45° - H

SECTION VII - REPAIR PARTS

For service or repairs to boiler, call your heating contractor. When seeking information on boiler, provide Boiler Model Number and Serial Number as shown on Rating Label.

Boiler Model Number	Boiler Serial Number	Installation Date
_V9_ _ A	6_ _ _ _ _ _ _	
Heating Contractor		Type of Fuel
Address		Phone Number

All V9A Series Repair Parts may be obtained through your local Burnham Wholesale distributor. Should you require assistance in locating a Burnham Distributor in your area, or have questions regarding the availability of Burnham products or repair parts, please contact Burnham Customer Service at 888-791-3790 or Fax (717) 293-5803.

SECTION VII - REPAIR PARTS (CONTINUED)

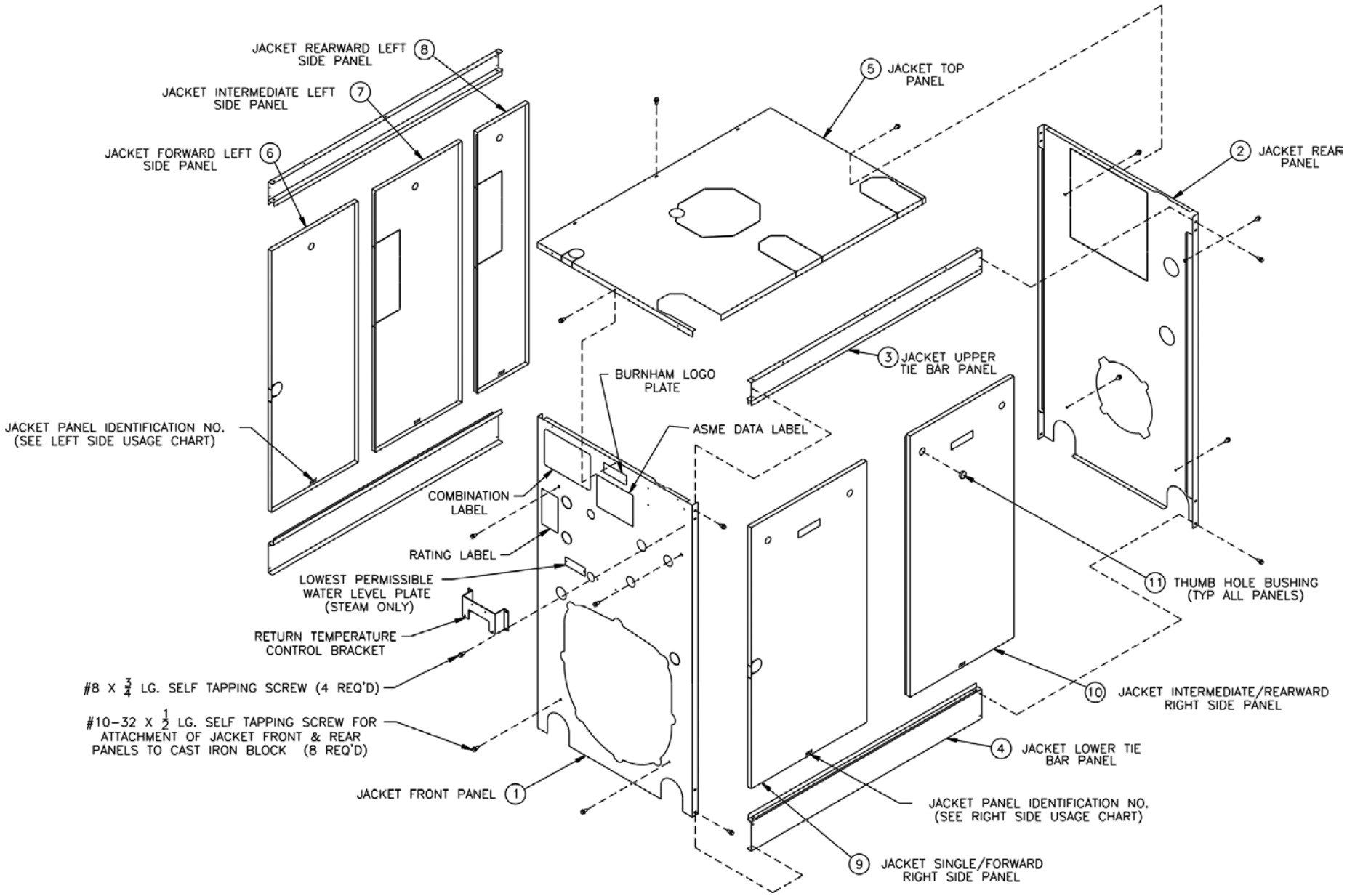


Figure 39: V9A Series Jacket Assembly (Boiler Models V903A thru V912A)

JACKET REPAIR PARTS (Models V903A Thru V912A)

ITEM NO.	DESCRIPTION	BOILER SIZE / QUANTITY										PART NO.
		V903A	V904A	V905A	V906A	V907A	V908A	V909A	V910A	V911A	V912A	
1	Jacket Front Panel Assembly	1	1	1	1	1	1	1	1	1	1	6042926
2	Jacket Rear Panel Assembly	1	1	1	1	1	1	1	1	1	1	6042927
3	Jacket Upper Tie Bar Panel Assemblies:											
3A	Jacket Upper Tie Bar Panel Assy., V903A	2										60429037
3B	Jacket Upper Tie Bar Panel Assy., V904A		2									60429047
3C	Jacket Upper Tie Bar Panel Assy., V905A			2								60429057
3D	Jacket Upper Tie Bar Panel Assy., V906A				2							60429067
3E	Jacket Upper Tie Bar Panel Assy., V907A					2						60429077
3F	Jacket Upper Tie Bar Panel Assy., V908A						2					60429087
3G	Jacket Upper Tie Bar Panel Assy., V909A							2				60429097
3H	Jacket Upper Tie Bar Panel Assy., V910A								2			60429107
3 I	Jacket Upper Tie Bar Panel Assy., V911A									2		60429117
3J	Jacket Upper Tie Bar Panel Assy., V912A										2	60429127
4	Jacket Lower Tie Bar Panel Assemblies:											
4A	Jacket Lower Tie Bar Panel Assy., V903A	2										60429038
4B	Jacket Lower Tie Bar Panel Assy., V904A		2									60429048
4C	Jacket Lower Tie Bar Panel Assy., V905A			2								60429058
4D	Jacket Lower Tie Bar Panel Assy., V906A				2							60429068
4E	Jacket Lower Tie Bar Panel Assy., V907A					2						60429078
4F	Jacket Lower Tie Bar Panel Assy., V908A						2					60429088
4G	Jacket Lower Tie Bar Panel Assy., V909A							2				60429098
4H	Jacket Lower Tie Bar Panel Assy., V910A								2			60429108
4 I	Jacket Lower Tie Bar Panel Assy., V911A									2		60429118
4J	Jacket Lower Tie Bar Panel Assy., V912A										2	60429128
5	Jacket Top Panel Assemblies:											
5A	Jacket Top Panel Assembly, V903A	1										604290331
5B	Jacket Top Panel Assembly, V904A		1									604290431
5C	Jacket Top Panel Assembly, V905A			1								604290531
5D	Jacket Top Panel Assembly, V906A				1							604290631
5E	Jacket Top Panel Assembly, V907A					1						604290731
5F	Jacket Top Panel Assembly, V908A						1					604290831
5G	Jacket Top Panel Assembly, V909A							1				604290931
5H	Jacket Top Panel Assembly, V910A								1			604291031
5 I	Jacket Top Panel Assembly, V911A									1		604291131
5J	Jacket Top Panel Assembly, V912A										1	604291231
6	Jacket Forward Left Side Panel Assemblies:											
6A	Jacket Forward L.S. Pnl. Assy., No L5	1			1			1			1	6042914
6B	Jacket Forward L.S. Pnl. Assy., No L11		1			1			1			6042915
6C	Jacket Forward L.S. Pnl. Assy., No L17			1			1			1		6042917
7	Jacket Intermediate Left Side Panel Assy., No. L18				1	1	1	2	2	2	3	6042918
8	Jacket Rearward Left Side Panel Assembly, No. L10	1	1	1	1	1	1	1	1	1	1	6042913
9	Jacket Single/Forward Right Side Panel Assemblies:											
9A	Jacket Single/Forward R.S. Pnl. Assy., No. R15	1				1						6042919
9B	Jacket Single/Forward R.S. Pnl. Assy., No. R21		1				1				1	6042920
9C	Jacket Single/Forward R.S. Pnl. Assy., No. R27			1				1	1			6042921
9D	Jacket Single/Forward R.S. Pnl. Assy., No. R33				1					1		6042922
10	Jacket Intermediate/Rearward Right Side Panel											
10A	Jacket Intermed/Rrward R.S. Pnl. Assy., No. R24					1	1	1			2	6042923
10B	Jacket Intermed/Rrward R.S. Pnl. Assy., No. R30								1	1		6042924
11	Thumb Hole Bushing, Heyco SB-1093-15, #2166 Black	3	4	4	5	6	7	8	8	8	11	8136257

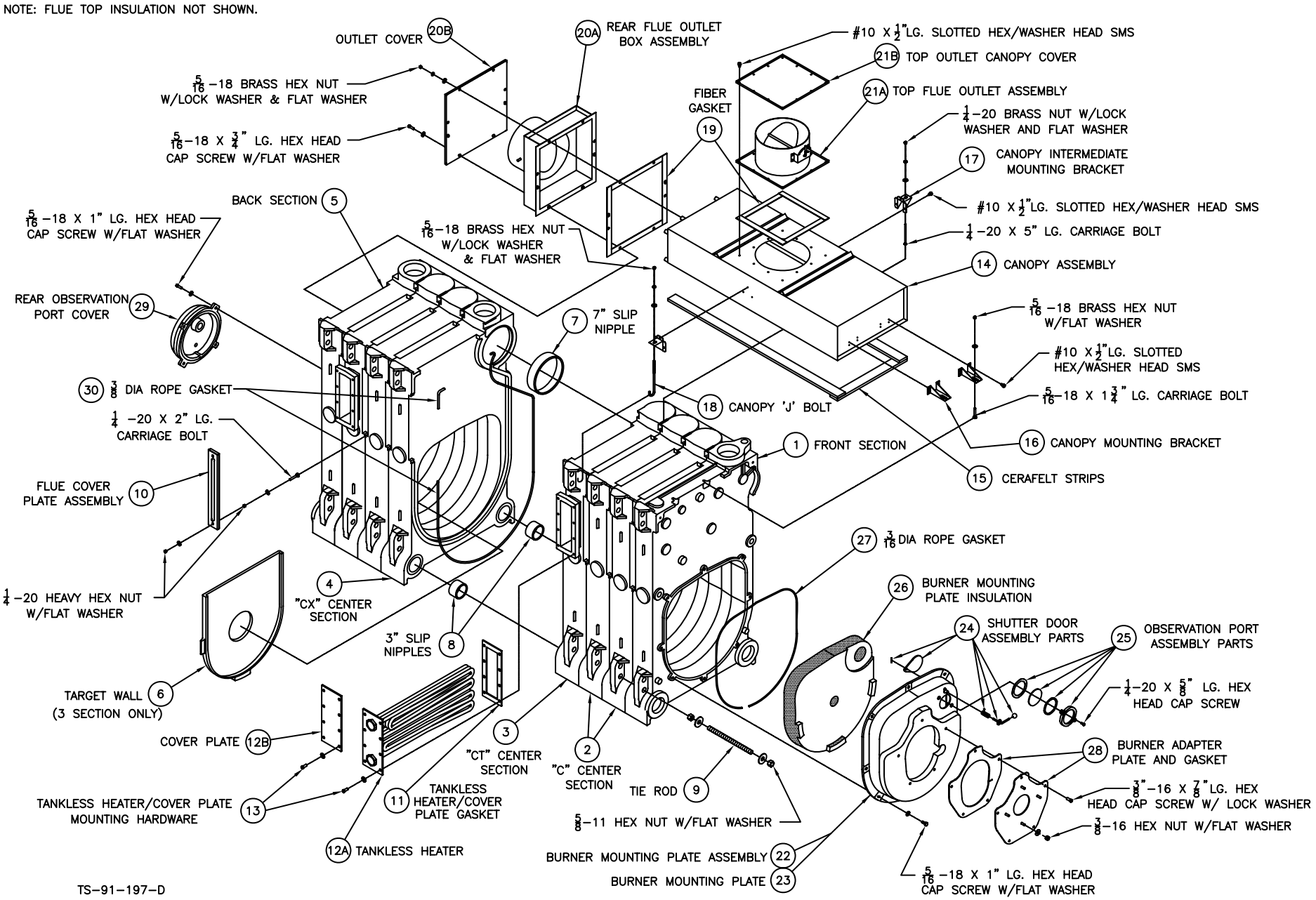


Figure 40: Bare Boiler Assembly

REPAIR PARTS FOR BARE BOILER ASSEMBLY

ITEM NO.	DESCRIPTION	BOILER SIZE / QUANTITY										PART NO.
		V903A	V904A	V905A	V906A	V907A	V908A	V909A	V910A	V911A	V912A	
1	Front Section	1	1	1	1	1	1	1	1	1	1	7172936
2	“C” Center Section - Steam Boiler	1	2	3	4	5	6	7	8	9	10	7172940
	Water Boiler	1	2	3	4	5	6	7	8	9	10	7172940
3	Optional - “CT” Center Section w/Tankless Heater Opening - Max. No. of Heaters - (“CT” Replaces “C” Center Section)	1	1	1	2	2	2	3	3	3	4	7172941
4	“CX” Center Section with 4” Supply Tapping - Steam Boiler Only										1	7172942
5	Back Section	1	1	1	1	1	1	1	1	1	1	7172938
6	Target Wall (V903A only)	1										6202901
	Silastic, 500°F, 10 oz. Tube	2	3	3	4	5	6	6	7	8	9	9056060
7	7” Cast Iron Slip Nipple	2	3	4	5	6	7	8	9	10	11	7066004
8	3” Cast Iron Slip Nipple	4	6	8	10	12	14	16	18	20	22	7066002
	Nipple Lubricant, Loctite® #592, 50 ml	1	2	2	3	3	4	4	5	5	6	8056254
	Nipple Gauge, 3” & 7”	1	1	1	1	1	1	1	1	1	1	806600023
9	5/8” - 11 x 9-3/4”” Lg. Tie Rod	8	12	16	20	24	28	32	36	40	44	80861101
10	Formed Steel Flue Cover Plate (with insulation)	2	3	4	5	6	7	8	9	10	11	6112901
11	Tankless Heater/Cover Plate Gasket	(One Required for each “CT” Section)										8036058
12A	V9-2 Tankless Heater Assembly (Includes gasket & mounting hdwe)	(One Required for each “CT” Section)										6032901
	- OR -											60429048
12B	Blank Heater Cover Plate	(One Required for each “CT” Section)										7036020
13	Tankless Heater /Cover Plate Mounting Hardware, 3/8” -17-7/8” Lg.	(Eight Required for each “CT” Section)										80361337
	Cap Screw, SA-307B (ASME Code Mat’l)											
		1										6112903001
			1									6112904001
				1								6112905001
					1							6112906001
						1						6112907001
14	Canopy Assemblies						1					6112908001
								1				6112909001
									1			6112910001
										1		6112911001
											1	6112912001
15	Cerafelt Gasket, 1/2” x 2” Wide x L.F.	5	6	7	8	9	10	11	12	13	14	9206003
16	Canopy Mounting Bracket (Front)	2	2	2	2	2	2	2	2	2	2	71129002
17	Canopy Intermediate Hold-Down Bracket					2	2	2	4	4	4	71129007
18	Canopy ‘J’ Bolt, 5/16 - 18 x 7-3/4 Lg.					1	1	1	2	2	2	80861679
19	Adhesive Fiber Gasket, 1/8” x 1” Wide x L.F.	10	10	10	10	10	10.5	10.5	10.5	11	11	9206032
20A	Rear Flue Outlet Assembly, 7” Dia. Collar	1	1									61129003
	Rear Flue Outlet Assembly, 8” Dia. Collar			1	1	1						61129042
	Rear Flue Outlet Assembly, 10” Dia. Collar						1	1	1			61129062
	Rear Flue Outlet Assembly, 12” Dia. Collar									1	1	61129092
	- OR -											
20B	Rear Flue Outlet Cover	1	1	1	1	1	1	1	1	1	1	61129001
21A	Top Flue Outlet Assembly, 7” Dia. Collar	1	1									
	Top Flue Outlet Assembly, 8” Dia. Collar			1	1	1						6112627
	Top Flue Outlet Assembly, 10” Dia. Collar						1	1	1			6112628
	Top Flue Outlet Assembly, 12” Dia. Collar									1	1	6112629
	- OR -											

REPAIR PARTS FOR BARE BOILER ASSEMBLY (Continued)

ITEM NO.	DESCRIPTION	BOILER SIZE / QUANTITY										PART NO.
		V903A	V904A	V905A	V906A	V907A	V908A	V909A	V910A	V911A	V912A	
21B	Top Outlet Canopy Cover, 7 & 8” Dia. Opening	1	1	1	1	1						7112638
	Top Outlet Canopy Cover, 10” Dia. Opening						1	1	1			7112639
	Top Outlet Canopy Cover, 12” Dia. Opening									1	1	7112640
22	Burner Mounting Plate Assemblies (Incl. Items 23-27 & Mtg. Hdwe)											
	8” Extended Burner Mounting Plate Assembly	1	1	1								6022909
	- OR -											
	4” Standard Burner Mounting Plate Assembly			1	1	1	1	1	1	1	1	6022908
23	Burner Mounting Plate:											
	8” Extended C.I. Burner Mounting Plate (Machined & Painted)	1	1	1								7172913
	- OR -											
	4” Extended C.I. Burner Mounting Plate (Machined & Painted)			1	1	1	1	1	1	1	1	7172912
24	Shutter Door Assembly Parts:											
	Handle Knob	1	1	1	1	1	1	1	1	1	1	8026036
	Shutter Handle	1	1	1	1	1	1	1	1	1	1	8026033
	Shutter Spring	1	1	1	1	1	1	1	1	1	1	8026034
	Observation Port Shutter (Machined & Painted)	1	1	1	1	1	1	1	1	1	1	70260051
	Spring Pin	1	1	1	1	1	1	1	1	1	1	8026035
25	Observation Port Assembly Parts:											
	Observation Port Cover (Machined & Painted)	1	1	1	1	1	1	1	1	1	1	70260041
	Observation Port Outer Gasket	1	1	1	1	1	1	1	1	1	1	8206001
	Observation Port Glass	1	1	1	1	1	1	1	1	1	1	8026032
	Observation Port Inner Gasket	1	1	1	1	1	1	1	1	1	1	8206002
26	8” Extended Burner Mounting Plate Insulation	1	1	1								8202905
	-OR -											
	4” Standard Burner Mounting Plate Insulation			1	1	1	1	1	1	1	1	8202904
27	3/16” Dia. Rope Gasket	1	1	1	1	1	1	1	1	1	1	72026021
28	Burner Adapter Plate Assembly w/Gasket and Hardware:											
	Beckett (“CF”) BAP No. 920, 4-3/4” Dia. Hole	1	1	1								602292201
	Beckett (“CF”) BAP No. 921, 6-1/8” Dia. Hole				1	1	1					602292211
	Beckett (“CF”) BAP No. 922, 6-3/4” Dia. Hole							1	1	1	1	602292221
	- OR -											
	Carlin (“CRD”) BAP No. 930, 4-1/2” Dia. Hole	1	1	1								602292301
	Carlin (“CRD”) BAP No. 931, 6-1/4” Dia. Hole				1	1	1	1	1	1	1	602292311
	- OR -											
	Power Flame (“C”) BAP No. 940 , 7-1/2” Dia. Hole		1	1	1	1						602292401
	Power Flame (“C”) BAP No. 941 , 9” Dia. Hole						1	1	1	1	1	602292411
	- OR -											
	Power Flame (“JR”) BAP No. 945 , 6-3/8” Dia. Hole	1	1	1	1							602292451
	Power Flame (“JR”) BAP No. 946 , 8-3/8” Dia. Hole					1	1	1				602292461
	- OR -											
	Webster BAP No. 960, 6-5/8” Dia. Hole	1	1	1	1	1	1	1	1	1	1	602229260
	Burner Adapter Plate Gasket Only	1	1	1	1	1	1	1	1	1	1	8202906
29	Rear Observation Port Cover Assembly (Incl. Gasket & Mtg. Hdwe)	1	1	1	1	1	1	1	1	1	1	609600011
	Gasket Only	1	1	1	1	1	1	1	1	1	1	9206060
30	3/8” Diameter Rope Gasket	2	3	4	5	6	7	8	9	10	11	7202948
	Press Relief Door Assembly (not shown)	1	1	1	1	1	1	1	1	1	1	61125251
	Press Relief Door Gasket (not shown)	1	1	1	1	1	1	1	1	1	1	8206003

STEAM TRIM / WATER TRIM

STEAM TRIM	BOILER SIZE / QUANTITY V903A/ V904A	V905A/V908A	V909A/V912A	PART NO.
Pressuretrol: Honeywell L404F1060	1	1	1	80160942
Honeywell L4079B1033 (Pkgd. Boiler)	1	1	1	80160943
Low Water Cutoff, M&M 63M (Pkgd. Boiler Only)	1	1	1	80160509
Steam Gauge, 3½" Dia. Ametek #144350	1	1	1	8056022
Gauge Glass Set, Conbraco #20-104-10 (10")	1	1	1	8056206
Safety Valve Piping:				
Hex Bushing, 1½" NPT x 1" FPT, Black	1			806600521
Hex Bushing, 1½" NPT x 1¼" FPT, Black		1		806600539
Nipple, 1" NPT x 3½" Lg., Black	1			806600217
Nipple, 1¼" NPT x 3½" Lg. Black		1		806600218
Nipple, 1½" NPT x 3½" Lg., Black			1	806600015
Tee, 1" NPT, Black	1			806601073
Tee, 1¼" NPT, Black		1		806601031
Tee, 1½" NPT, Black			1	806601025
Pipe Plug, 1" NPT, Square Head, Black	1			80660350
Pipe Plug, 1¼" NPT, Square Head, Black		1		806603502
Pipe Plug, 1½" NPT, Square Head, Black			1	806603515
Safety Valve, Conbraco #13-202-08, 1" MPT x FPT, 15# W.P.	1			81660501
Safety Valve, Conbraco #13-213-08, 1¼" MPT x 1½" FPT, 15# W.P.		1		81660505
Safety Valve, Conbraco #13-214-08, 1½" MPT x 2" FPT, 15# W.P.			1	81660503
Control Fittings:				
Hex Bushing, ¾" NPT x ¼" FPT, Black (Mount Syphon - K.D. Boiler)	1	1	1	806600508
(Mount Syphon - Pkgd. Boiler)	2	2	2	806600508
Hex Bushing, ½" NPT x ¼" FPT, Black (Mount Steam Gauge)	1	1	1	806600524
Syphon, ¼" NPT x 90°, 1-7/8" x 4" Extended Leg (K.D. Boiler)	1	1	1	806603010
(Pkgd. Boiler)	2	2	2	806603010
Plug Extra Tappings:				
Pipe Plug, ¾" NPT, Countersunk, Black	1	1	1	806603504
Pipe Plug, 1" NPT, Countersunk, Black	1	1	1	806603517
Pipe Plug, ¾" NPT, Square Head, Black	2	2	2	806603512
Pipe Plug, 1" NPT, Square Head, Black	4	3	3	806603501
Lowest Permissible Water Level Plate, Form No. 1203	1	1	1	81460009

WATER TRIM	V903A/V907A	V908A/V909A	V910A/V912A	PART NO.
Aquastat Controller: Honeywell L4006A2015 (K.D. & Pkgd. Boilers)	1	1	1	80160400
Honeywell L4006E1133 (Pkgd. Boiler Only)	1	1	1	80160703
Immersion Well, Honeywell #123871A, ¾" NPT (K.D. Boiler)	1	1	1	80160452
(Pkgd. Boiler)	2	2	2	80160452
Low Water Cutoff, M&M 751P-MT (Pkgd. Boiler Only)	1	1	1	80160718
Temperature / Pressure Gauge, Ametek #144840, ½" NPT	1	1	1	8056028
Relief Valve Piping:				
Hex Bushing, 1½" NPT x ¾" FPT, Black	1			806600507
Hex Bushing, 1½" NPT x 1" FPT, Black		1	1	806600521
Nipple, ¾" NPT x 3½" Lg., Black	1			806600038
Nipple, 1" NPT x 3½" Lg., Black		1	1	806600217
Street Elbow, ¾" NPT x 90°, Malleable	1			806601501
Street Elbow, 1" NPT x 90° Malleable		1	1	806601514
Relief Valve, Conbraco #10-102-10, ¾" x 1" FPT, 50# W.P.	1			81660387
Relief Valve, Conbraco #10-605-10, 1" x 1" FPT, 50# W.P.		1		81660805
Relief Valve, Conbraco #10-615-10, 1" x 1¼" FPT, 50# W.P.			1	81660362
Plug Extra Tappings:				
Pipe Plug, ½" NPT, Countersunk, Black	2	2	2	806603510
Pipe Plug, ¾" NPT, Countersunk, Black	1	1	1	806603504
Pipe Plug, 1" NPT, Countersunk, Black	1	1	1	806603517
Pipe Plug, ¾" NPT, Square Head, Black	2	2	2	806603512
Pipe Plug, 1" NPT, Square Head, Black	3	3	3	806603501

SERVICE RECORD

DATE SERVICE PERFORMED

SERVICE RECORD

DATE SERVICE PERFORMED

Limited Warranty

For Commercial Grade Boilers

Using Cast Iron, Carbon Steel,
or Stainless Steel Heat Exchangers
and Parts / Accessories

Subject to the terms and conditions set forth below, Burnham Commercial, Lancaster, Pennsylvania hereby extends the following limited warranties to the original owner of a commercial grade water or steam boiler or Burnham Commercial supplied parts and/or accessories manufactured and shipped on or after October 1, 2009:

ONE YEAR LIMITED WARRANTY ON COMMERCIAL GRADE BOILERS AND PARTS / ACCESSORIES SUPPLIED BY BURNHAM COMMERCIAL.
Burnham Commercial warrants to the original owner that its commercial grade water and steam boilers and parts/accessories comply at the time of manufacture with recognized hydronic industry standards and requirements then in effect and will be free of defects in material and workmanship under normal usage for a period of one year from the date of original installation. If any part of a commercial grade boiler or any part or accessory provided by Burnham Commercial is found to be defective in material or workmanship during this one year period, Burnham Commercial will, at its option, repair or replace the defective part (not including labor).

HEAT EXCHANGER WARRANTIES
Burnham Commercial warrants to the original owner that the heat exchanger of its commercial grade boilers will remain free from defects in material and workmanship under normal usage for the time period specified in the chart below to the original owner at the original place of installation. If a claim is made under this warranty during the "No Charge" period from the date of original installation, Burnham Commercial will, at its option, repair or replace the heat exchanger (not including labor). If a claim is made under this warranty after the expiration of the "No Charge" period from the date of original installation, Burnham Commercial will, at its option and upon payment of the pro-rated service charge set forth below, repair or replace the heat exchanger. The service charge applicable to a heat exchanger warranty claim is based upon the number of years the heat exchanger has been in service and will be determined as a percentage of the retail price of the heat exchanger model involved at the time the warranty claim is made as follows:

	Service Charge as a % of Retail Price									
Years in Service	1	2	3	4	5	6	7	8	9	10+
Cast Iron	No Charge									100
Carbon Steel	No Charge	100								
Stainless Steel	No Charge					20	40	60	80	100

NOTE: If the heat exchanger involved is no longer available due to product obsolescence or redesign, the value used to establish the retail price will be the published price as set forth in Burnham Commercial Repair Parts Pricing where the heat exchanger last appeared or the current retail price of the then nearest equivalent heat exchanger, whichever is greater.

ADDITIONAL TERMS AND CONDITIONS

1. Applicability: The limited warranties set forth above are extended only to the original owner at the original place of installation within the United States and Canada. These warranties are applicable only to boilers, parts, or accessories designated as commercial grade by Burnham Commercial and installed and used exclusively for purposes of commercial space heating or domestic hot water generation through a heat exchanger (or a combination for such purposes) and do not apply to residential grade products or industrial uses.
2. Components Manufactured by Others: Upon expiration of the one year limited warranty on commercial grade boilers, all boiler components other than heat exchangers manufactured by others but furnished by Burnham Commercial (such as oil burner, circulator and controls) will be subject only to the manufacturer's warranty, if any.
3. Proper Installation: The warranties extended by Burnham Commercial are conditioned upon the installation of the commercial grade boiler, parts, and accessories in strict compliance with Burnham Commercial installation instructions. Burnham Commercial specifically disclaims liability of any kind caused by or relating to improper installation.
4. Proper Use and Maintenance: The warranties extended by Burnham Commercial conditioned upon the use of the commercial grade boiler, parts, and accessories for its intended purposes and its maintenance accordance with Burnham Commercial recommendations and hydronics industry standards. For proper installation, use, and maintenance, see all applicable sections of the Installation and Operating, and Service Instructions Manual furnished with the unit.
5. This warranty does not cover the following:
   a. Expenses for removal or reinstallation. The owner will be responsible for the cost of removing and reinstalling the alleged defective part or its replacement and all labor and material connected therewith, and transportation to and from Burnham Commercial.
   b. Components that are part of the heating system but were not furnished by Burnham Commercial as part of the commercial boiler.
   c. Improper burner adjustment, control settings, care or maintenance.
   d. This warranty cannot be considered as a guarantee of workmanship of an installer connected with the installation of the Burnham Commercial boiler, or as imposing on Burnham Commercial liability of any nature for unsatisfactory performance as a result of faulty workmanship in the installation, which liability is expressly disclaimed.
   e. Boilers, parts, or accessories installed outside the 48 contiguous United States, the State of Alaska and Canada.
   f. Damage to the boiler and/or property due to installation or operation of the boiler that is not in accordance with the boiler installation and operating instruction manual.
   g. Any damage or failure of the boiler resulting from hard water, scale buildup or corrosion the heat exchanger.
   h. Any damage caused by improper fuels, fuel additives or contaminated combustion air that may cause fireside corrosion and/or clogging of the burner or heat exchanger.
   i. Any damage resulting from combustion air contaminated with particulate which cause clogging of the burner or combustion chamber including but not limited to sheetrock or plasterboard particles, dirt, and dust particulate.
   j. Any damage, defects or malfunctions resulting from improper operation, maintenance, misuse, abuse, accident, negligence including but not limited to operation with insufficient water flow, improper water level, improper water chemistry, or damage from freezing.
   k. Any damage caused by water side clogging due to dirty systems or corrosion products from the system.
   l. Any damage resulting from natural disaster.
   m. Damage or malfunction due to the lack of required maintenance outlined in the Installation and Operating Manuals furnished with the unit.
6. Exclusive Remedy: Burnham Commercial obligation for any breach of these warranties is limited to the repair or replacement of its parts (not including labor) in accordance with the terms and conditions of these warranties.
7. Limitation of Damages: Under no circumstances shall Burnham Commercial be liable for incidental, indirect, special or consequential damages of any kind whatsoever under these warranties, including, but not limited to, injury or damage to persons or property and damages for loss of use, inconvenience or loss of time. Burnham Commercial liability under these warranties shall under no circumstances exceed the purchase price paid by the owner for the commercial grade boiler involved. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.
8. Limitation of Warranties: These warranties set forth the entire obligation of Burnham Commercial with respect to any defect in a commercial grade boiler, parts, or accessories and Burnham Commercial shall have no express obligations, responsibilities or liabilities of any kind whatsoever other than those set forth herein. These warranties are given in lieu of all other express warranties.

ALL APPLICABLE IMPLIED WARRANTIES, IF ANY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY LIMITED IN DURATION TO A PERIOD OF ONE YEAR EXCEPT THAT IMPLIED WARRANTIES, IF ANY, APPLICABLE TO THE HEAT EXCHANGER IN A COMMERCIAL GRADE BOILER SHALL EXTEND TO THE ORIGINAL OWNER FOR THE TIME SPECIFIED IN THE HEAT EXCHANGER SECTION SHOWN ABOVE AT THE ORIGINAL PLACE OF INSTALLATION. SOME STATES DO NOT ALLOW LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

PROCEDURE FOR OBTAINING WARRANTY SERVICE
In order to assure prompt warranty service, the owner is requested to complete and mail the Warranty Card provided with the product or register product online at www.burnhamcommercialcastiron.com within ten days after the installation of the boiler, although failure to comply with this request will not void the owner's rights under these warranties. Upon discovery of a condition believed to be related to a defect in material or workmanship covered by these warranties, the owner should notify the installer, who will in turn notify the distributor. If this action is not possible or does not produce a prompt response, the owner should write to Burnham Commercial, P.O. Box 3939, Lancaster, PA 17604, giving full particulars in support of the claim. The owner is required to make available for inspection by Burnham Commercial or its representative the parts claimed to be defective and, if requested by Burnham Commercial to ship these parts prepaid to Burnham Commercial at the above address for inspection or repair. In addition, the owner agrees to make all reasonable efforts to settle any disagreement arising in connection with a claim before resorting to legal remedies in the courts.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

BURNHAM®
Commercial Boilers

Pub. No. BCL1109041

Burnham Commercial, P.O. Box 3939, Lancaster, PA 17604
Revised November 1, 2009